The Only Journal With a Paid Circulation in the Rock Products Industry

Rock Products

Vol. XXIII, No. 24 CHICAGO November 20, 1920

EDITORIAL DEPARTMENT—
Nathan C. Rockwood, Editor
Chas. A. Breskin, Assistant Editor

BUSINESS DEPARTMENT—
Geo. P. Miller, Manager.

EASTERN OFFICE—
Chas. H. Fuller, Manager, 101 West 41st Street, New York City, N. Y.

CIRCULATION DEPARTMENT—
H. J. Wolfe, Manager. Circulation 5300 copies net. Applicant for membership Audit Bureau of Circulation.

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T. J. Sullivan, Vice-President.
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Round Trip Every 7 Minutes

In constructing a 10 mile section of cement roadway, 24 feet wide, on the Lackawanna Trail, it was necessary for a 3-Ton PLYMOUTH Gasoline Locomotive to make 9 round trips every hour between bin and paver, hauling eight batch boxes per trip over a tenth-mile portable track, and completing five hundred feet daily.

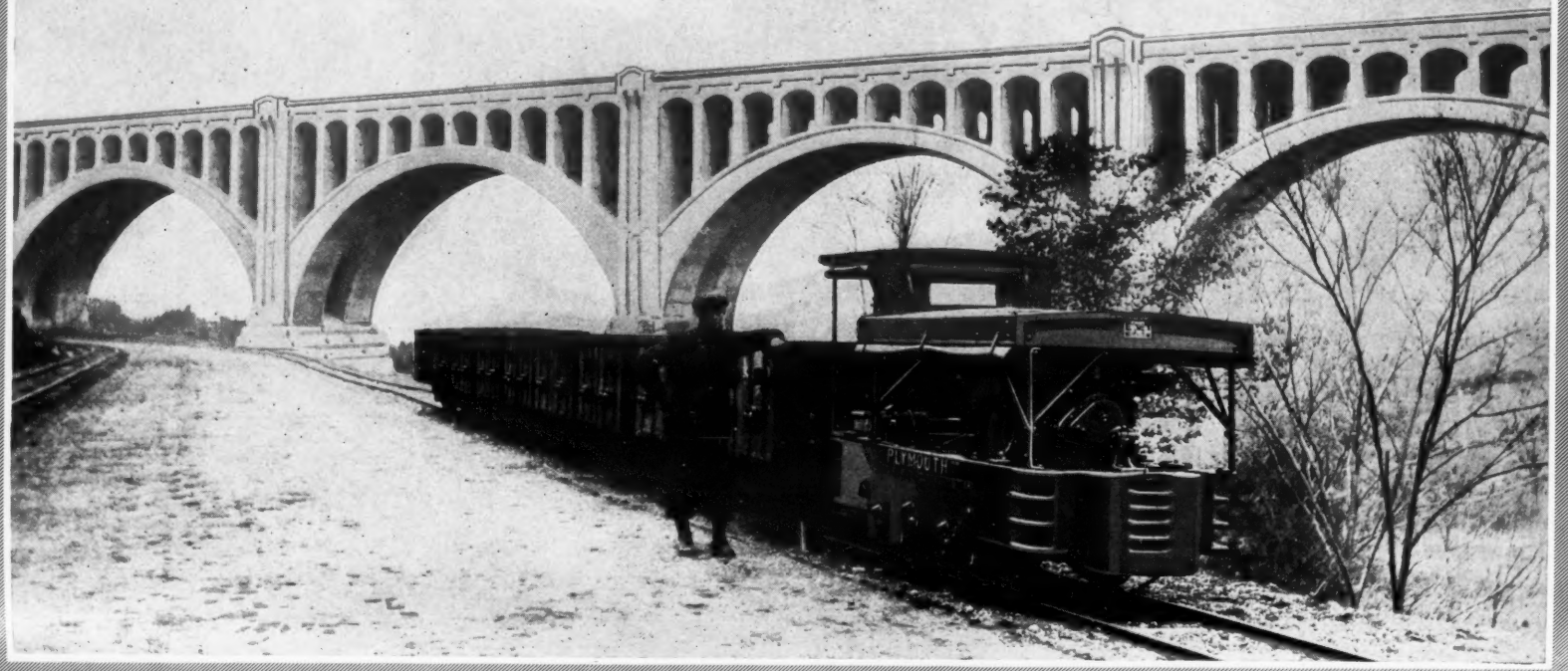
It is shown in the illustration along side of its handiwork, proud of its share in the achievement, and eager to tackle any haul, long or short.

PLYMOUTH

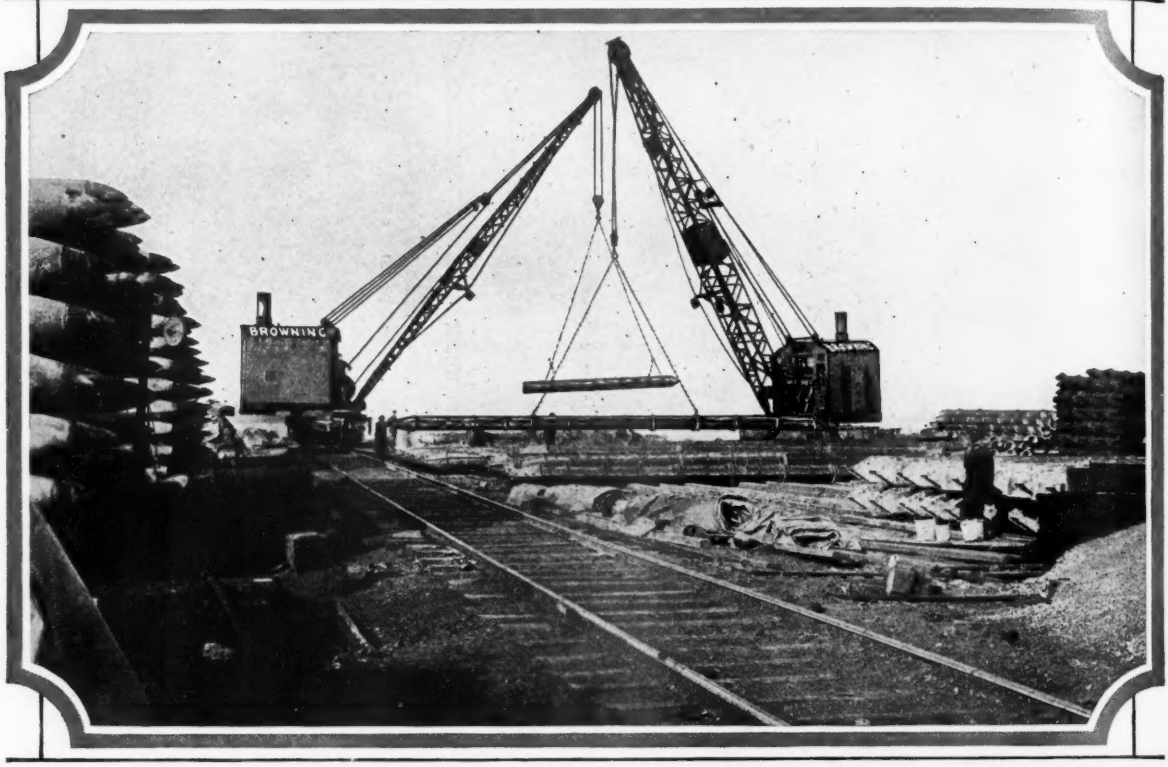
Gasoline Locomotives

THE FATE-ROOT-HEATH COMPANY

Riggs Avenue. *Plymouth, Ohio.*



BROWNING



LOCOMOTIVE CRANES

BROWNING Locomotive Cranes were a big factor in making a success of this concrete pile plant. Their speed in handling all raw materials, together with their facility in handling the finished piles greatly reduced the production costs.

Wherever there are bulk materials to be moved they can economically be employed. For instance, in unloading crushed stone from cars their advantage is great. Not only is the cost per yard low, but a large gang of men is released for other work. With laborers getting seventy-five cents and up per hour, the contractor or plant owner who is employing a number of men, should investigate and see if the work may not be done more quickly and more cheaply by a Browning Locomotive Crane.

A catalog showing Browning Cranes at work on more than one hundred different jobs, gives some idea of their labor-saving possibilities. Write for your copy to-day.

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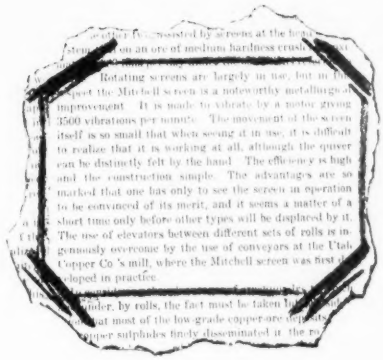
— *Views the* —
MITCHELL ELECTRIC VIBRATING SCREEN

"It seems a matter of only a short time when other types will be replaced by it."

The Mining & Scientific Press reprints in its issue of September 18 an article from "Chemical Engineering and Mining Review," published at Melbourne, Australia, an article entitled "The Treatment of American Low Grade Copper Ores."



Rotating screens are largely in use, but no ... upon the Mitchell screen is a noteworthy metallurgical improvement. It is made to vibrate by a motor giving 3500 vibrations per minute. The movement of the screen itself is so small that when seeing it in use, it is difficult to realize that it is working at all, although the quiver can be distinctly felt by the hand. The efficiency is high and the construction simple. The advantages are so marked that one has only to see the screen in operation to be convinced of its merit, and it seems a matter of a short time only before other types will be displaced by it. The use of elevators between different sets of rolls is ingeniously overcome by the use of conveyors at the Utah Copper Co.'s mill, where the Mitchell screen was first developed in practice.

The treatise describes the various methods employed in mining and milling low grade copper ore in the United States. One of the most important processes is that of screening the ore in the mill. The paragraph on this subject is reproduced in facsimile here.

This tribute to the Mitchell is one that is being repeated by **experts in eight different industries.** What the Mitchell has done in screening ore it is also doing in screening fertilizer, salt, sand, gravel, sugar, rice, grain, coke and coal.

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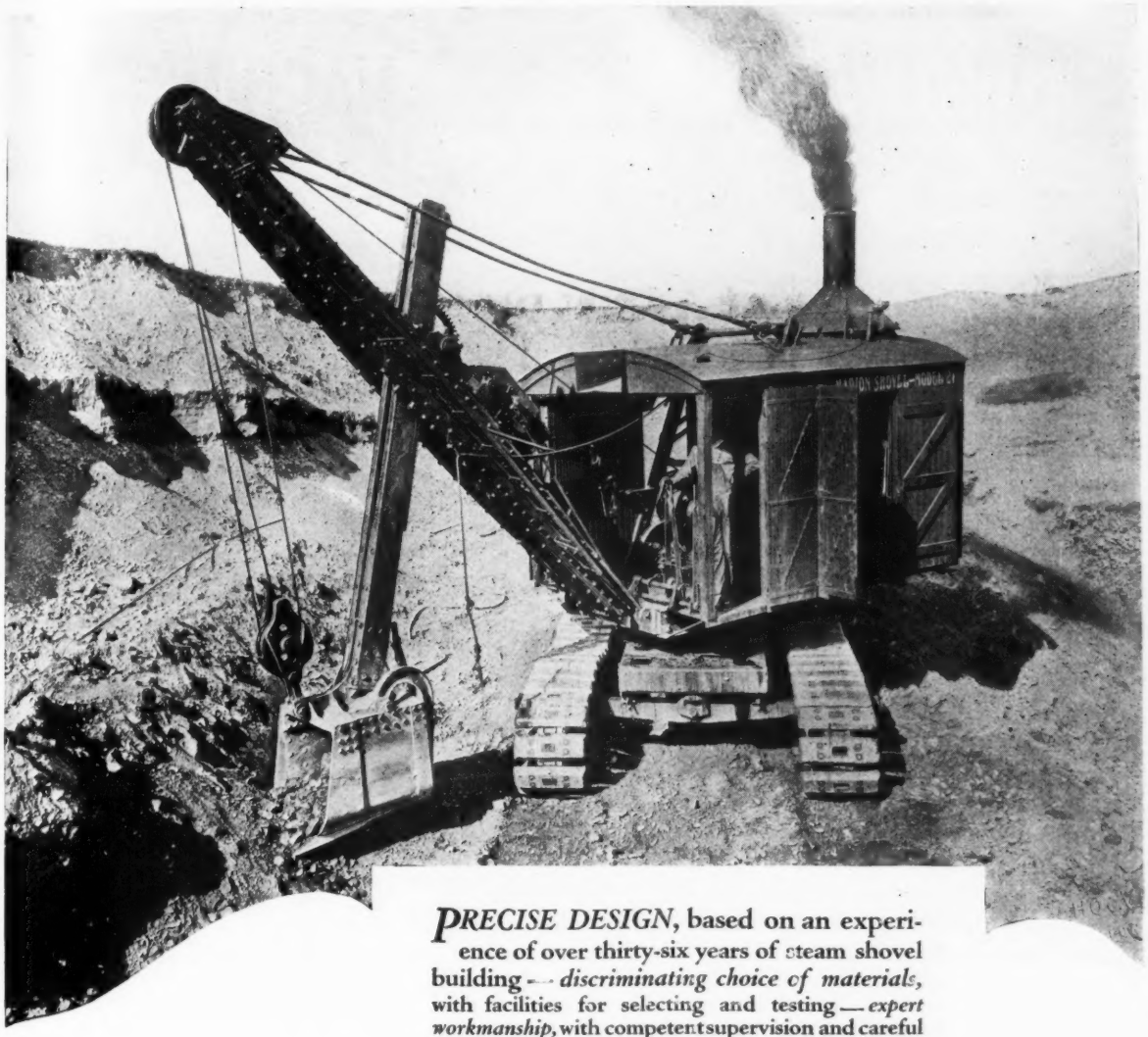
Stimpson Equipment Company

315 Felt Building **Salt Lake City, Utah**



PRECISE DESIGN, **based on an experience of over thirty-six years of steam shovel building — *discriminating choice of materials,* with facilities for selecting and testing — *expert workmanship,* with competent supervision and careful inspection—all are incorporated in the "Marion 21."**

Crawling traction trucks are the preferred mounting. The 6″ x 6″ main engines, with extra large boiler, insure ample power and steady performance. The wide working range of the dipper permits operating in restricted places or where maximum limits are required.

Dependable "Marions" are always preferred by experienced contractors. They use them because they know that "Marion" quality and service *can be trusted.*

Let us assist in selecting the type best suited for your work.

THE **Marion** STEAM SHOVEL CO.

Established 1884 Marion, Ohio

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Denver, - - - H. W. Moore & Co.
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EVERYWHERE RELIABLE — THE Marion STEAM SHOVEL CO. — ESTABLISHED 1884

Vertical Cross Section of wall showing the Preston-Lansing method of reinforcing.

Nothing Better for Storing Limestone, Sand, Glass Batch Bins, etc.

"We believe there is nothing on the market that will make a better storage bin for limestone, glass, sand or any such material than your 'ship-lap' Vitrified Tile Storage Bins provided with reinforcing of proper size twisted steel bars to each layer of tile," says the Becker Limestone Company, whose Preston-Lansing Storage Bin is illustrated below.

Preston Lansing Tile Storage Bins

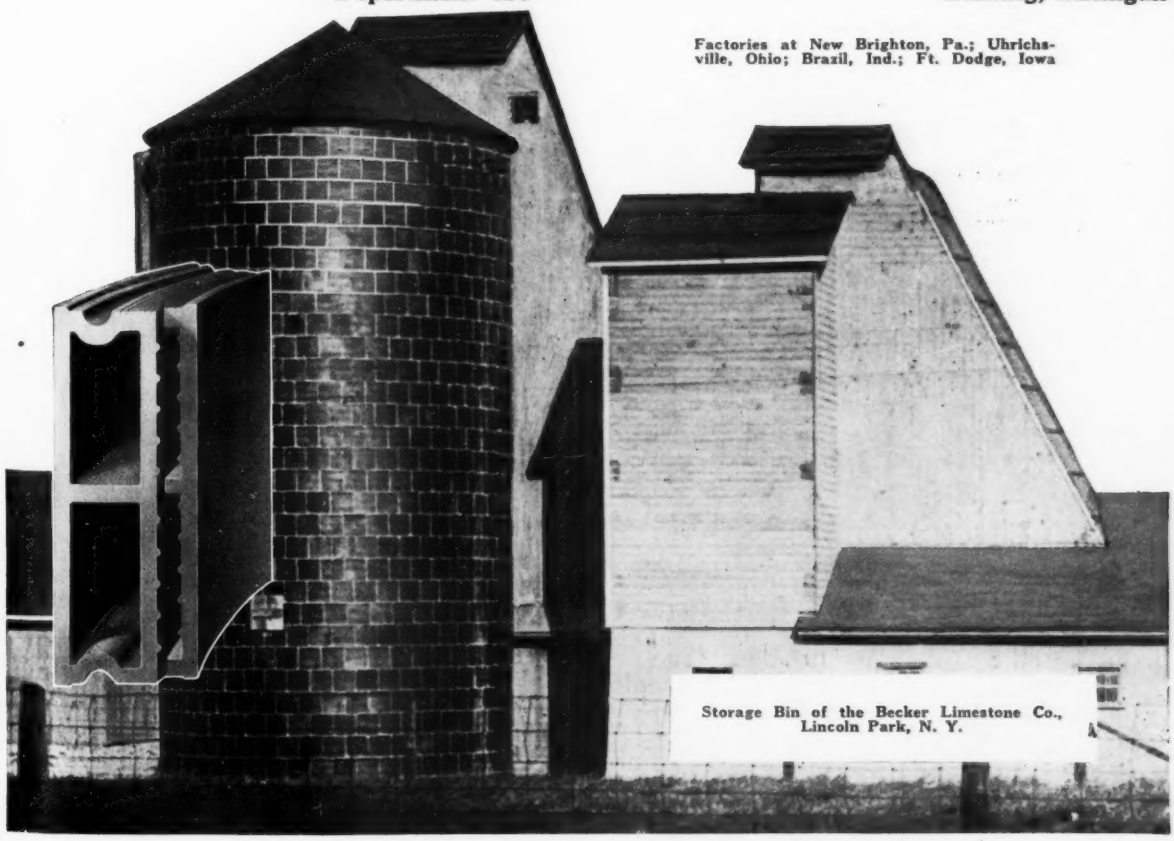
—reduce fire hazards—are moisture-proof and have no upkeep expense. Our special method of construction makes a bin with strength to withstand any strain. The blocks are braced against each other in "ship-lap" formation and reinforced between each tier by a twisted steel bar embedded in a thick layer of concrete.

Let us send you complete information showing how Preston-Lansing Bins have proven most economical in all parts of the country. Ask for catalogue and prices.

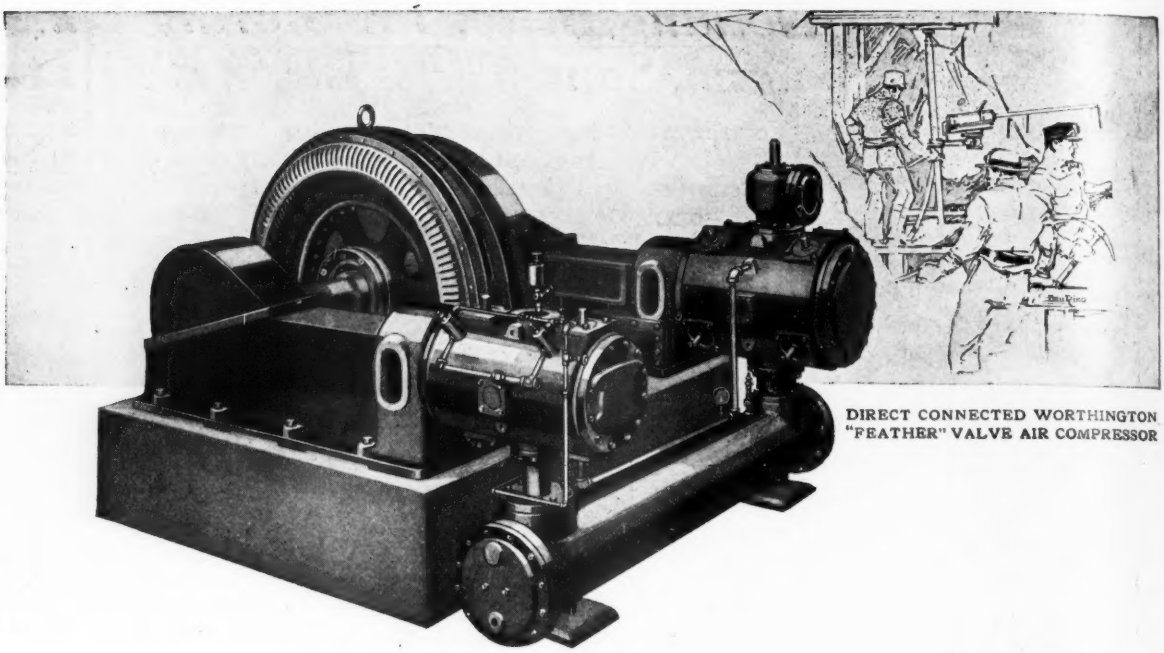
J. M. PRESTON COMPANY

Department 416 **Lansing, Michigan**

Factories at New Brighton, Pa.; Uhrichsville, Ohio; Brazil, Ind.; Ft. Dodge, Iowa



Storage Bin of the Becker Limestone Co., Lincoln Park, N. Y.



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Worthington "FEATHER" Valve Air Compressors

(Reg. U. S. Pat. Off.)

WHENEVER steady, always ready compressed air service is needed—Worthington meets the call. And as the line pressure is dependent upon the compressor, so is the compressor dependent upon its valves for efficient service and performance.

Worthington Air Compressors have been standardized with "FEATHER" Valves—the simplest, lightest, most efficient valve ever developed for air compressor work.

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Other Worthington Products:

Gyratory Crushers, Jaw Crushers, Air Compressors, Mine Pumps, Revolving Stone Screens, Ball and Tube Mills.

To further enlarge their service, Worthington have acquired the good-will and mechanical equipment of the Platt Iron Works, Dayton, Ohio, for manufacturing Oil Mill Machinery, Hydraulic Turbines, Feedwater Heaters and High Pressure Air Compressors.

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Power & Mining Works *Cudahy, Wis.*
Snow-Holly Works *Buffalo, N. Y.*
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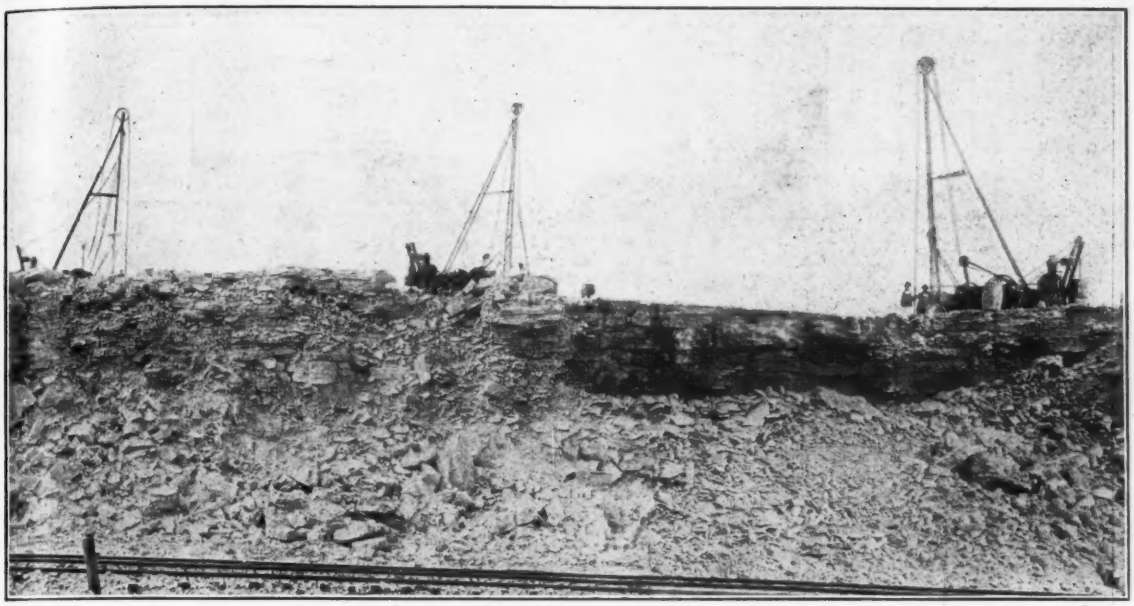

Do You Know That Relieved and Secure Feeling That Comes With a Good Supply of Broken Stone Ahead?

IN rock quarrying, blast hole drilling is the first step in the production of stone. The balance of the plant equipment representing a total investment of a hundred or more times the drill investment are dependent on this primary operation. A break down at this point upsets the whole production schedule and the overhead goes marching on.

You quarry foremen and superintendents who have hopped from knob to knob with a tripod on your back or have spent hours of overtime mending and patching what was supposed to be a blast hole drill so as to get enough rock ahead of the loading gang or the steam shovels can readily appreciate that feeling of relief and security that must come with the knowledge that there is plenty of broken stone ahead and that there is an easy method of replenishing this supply when needed.

One unfailing and positive means of obtaining an ample and constant supply of rock is through the operation of a Cyclone Number Fourteen Big Blast Hole Drill. This machine was designed and built for continuous operation. All working parts are cast steel—not gray iron; Oregon Fir is used for the frame; bearings are babbitted or bronze bushed where necessary—a thoroughly balanced and finished machine throughout.

The illustration above shows three Number Fourteen Gasoline Non-Traction Drills on the ledge of one of the largest lime quarries in the country. Note the large supply of broken stone against the face. This company solved their stone production problems back in 1910 when they purchased their first Cyclone. Orders for the other two machines came as a result of the perfect satisfaction given by the first.

The hardest and largest users of Big Blast Hole Drills have Cyclone Number Fourteen Drills in their pits and quarries. And almost without exception the original sold the additional machines as they were required.

If your stone production is not right, we believe that we can help you. Write for Blast Hole Data Sheet (Form 125).

We guarantee that our Number Fourteen Big Blast Hole Drill will drill more holes at less cost, all costs considered, than any other blast hole drill of the well driller type on the market. To demonstrate this we will place one of the outfits in your pit in competition against any or all other makes of blast hole drilling machines. If the Cyclone does not out-drill and out-wear all other makes, we will remove it from the work without cost to you.

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A good investment

PURCHASING an Austin Self-feeding Loader is a good investment, because

—it loads at 80% less than the cost of hand loading.

—it handles loose materials of every kind.

—it soon pays for itself by eliminating one truck. Three trucks with the Austin Loader will do the work of four trucks without it.

Ask for Catalog No W. L. 46

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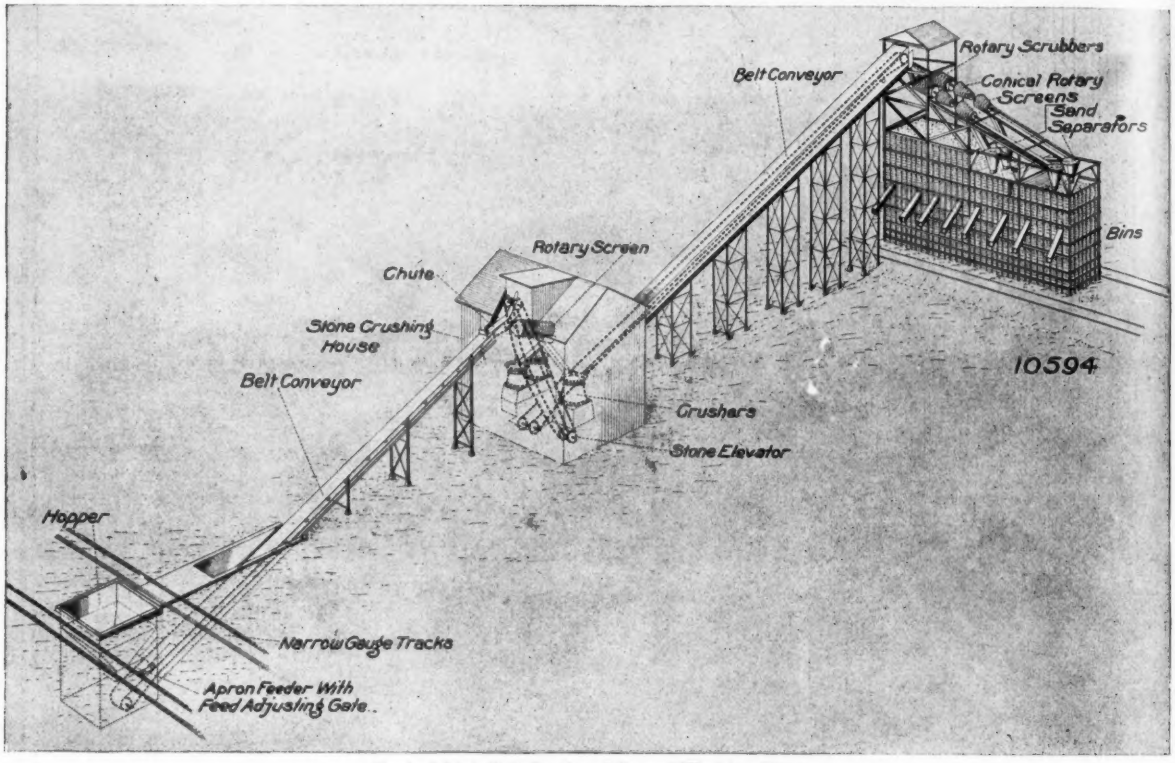
Sand and Gravel Washing Plants



Typical Link-Belt Sand and Gravel Washing Plant

LINK-BELT engineers have spent years in the study and development of methods for the efficient production of sand and gravel. They are specialists in this work.

Each Link-Belt plant is built to secure the greatest commercial advantages for its owners—whether the desired output be 10 or 300 carloads a day.

Each plant has its individuality, and the details of design make it the most efficient for its work, from every standpoint—economy of operation—high quality of material—simplicity—durability—reliability, etc.

Link-Belt screens, scrubbers, sand separators, excavators, spouts, gates, feeders, water pans, belt conveyors, bucket elevators, etc., are features of Link-Belt plants that earn dividends for their users.

If you contemplate additions to, or changes in your present equipment, or a new plant, why not put your problem up to our engineers? Send for catalog.

LINK-BELT COMPANY 605

Chicago—329 W. 39th Street **Philadelphia—Hunting Park Ave. and P. & R. Ry.**

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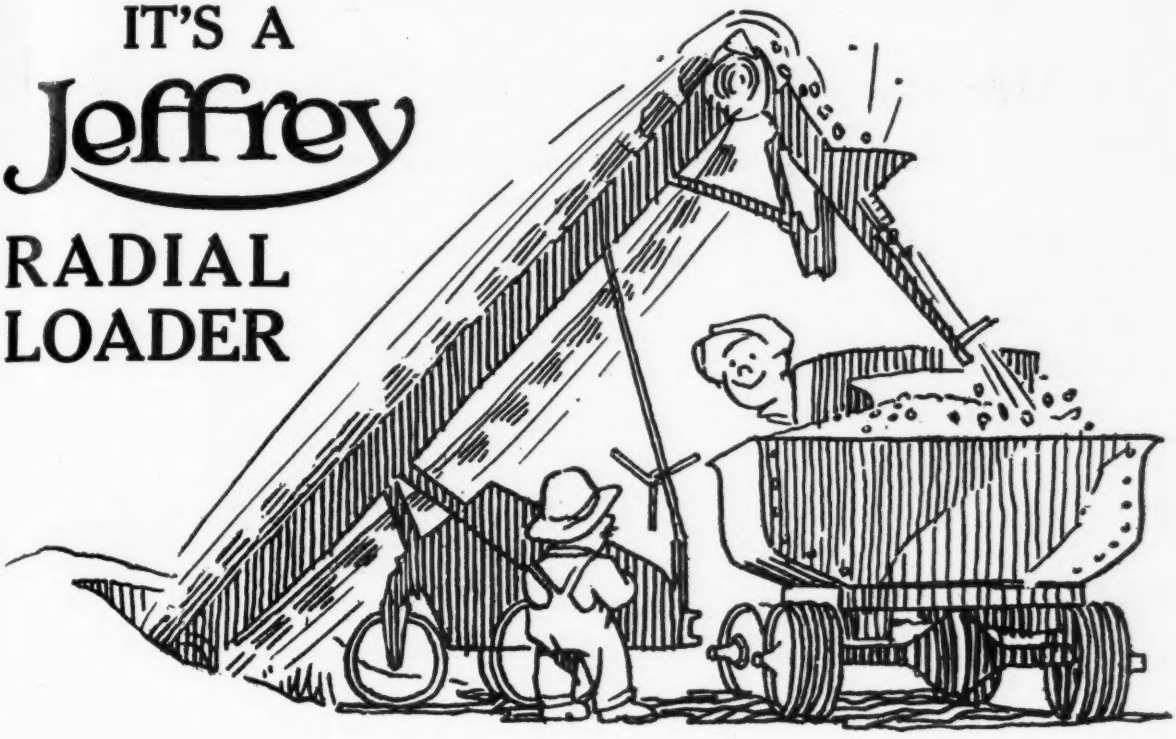
IT'S A Jeffrey RADIAL LOADER



A one man machine operated by unskilled labor.

Releases 5 to 10 men for other work.

No mechanical devices needed to bring material to buckets.

Digs 8 to 10 feet into the pile.

Type "K" Radial Loader handles 1 cubic yard of Sand, Gravel, Crushed Stone, Coal, Ashes and other loose materials, per minute. Type "G" 1½ to 2 cubic yards per minute.

Catalog No. 288-N—309-H.

Can operate and turn in a complete circle.

The Jeffrey Mfg. Company

935 North Fourth Street Columbus, Ohio

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Pittsburgh	Cleveland	Dallas	Buffalo
	Birmingham		

Handle it Mechanically

Rock Products

Vol. XXIII Chicago, November 20, 1920 No. 24

Something New in Gravel Plants

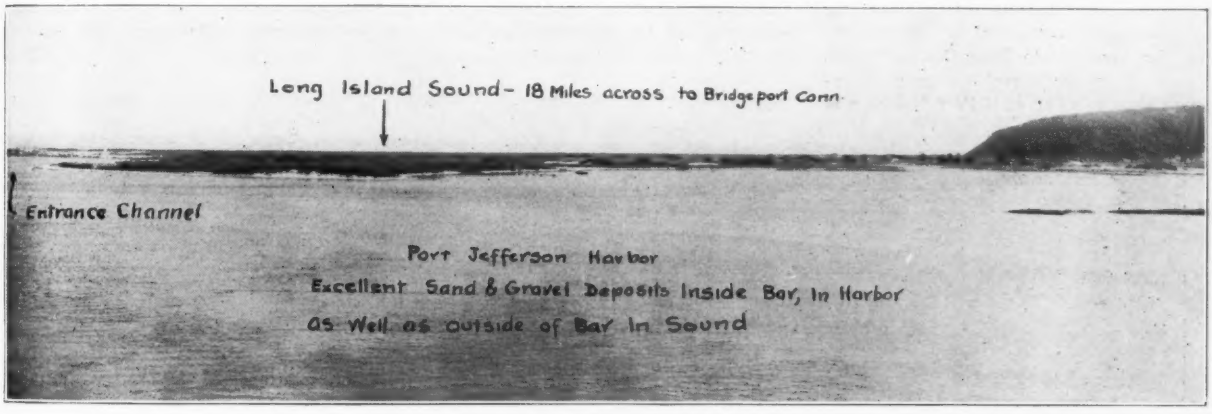
Hydraulic Dredge with Gravity Screens and Other Novel Details

By Pierce J. McAuliffe
Consulting Engineer, 17 Battery Place, New York

A SUCCESSFUL DEPARTURE from the beaten path has been made by George D. Perry, general manager of the Eastern Gravel Corporation, on his new hydraulically operated gravel dredge at Port Jefferson, L. I., N. Y., in that he has combined on a single hull for the first time, to the writer's belief, the well known features of the sand suckers used on Niagara River, where Mr. Perry operated for a number of years, with the gravity type of screening plant as originated by V. O. Johnston, president of the National Association of Sand and Gravel Producers, at his Lincoln, Ill., plant.

Mr. Perry's former experience with dredging pumps convinced him that they would be the most efficient equipment obtainable for raising the material from the bottom of the bay, while other conditions that he had to meet made necessary the settling tanks, which are a feature of the gravity screening plant.

The dredge is operating in the channel entrance to Port Jefferson Bay, Long Island Sound. It was therefore not permissible to return, back into the water, any fine sand which the pump should pick up, because it might be carried by the current to other parts of the channel and cause shoaling; moreover there are a number of oyster beds near his dredge and any fine sand, if allowed to return to the bay, might be de-



Figs. 1 and 2 showing the character of the region where the Eastern Gravel Corporation is operating

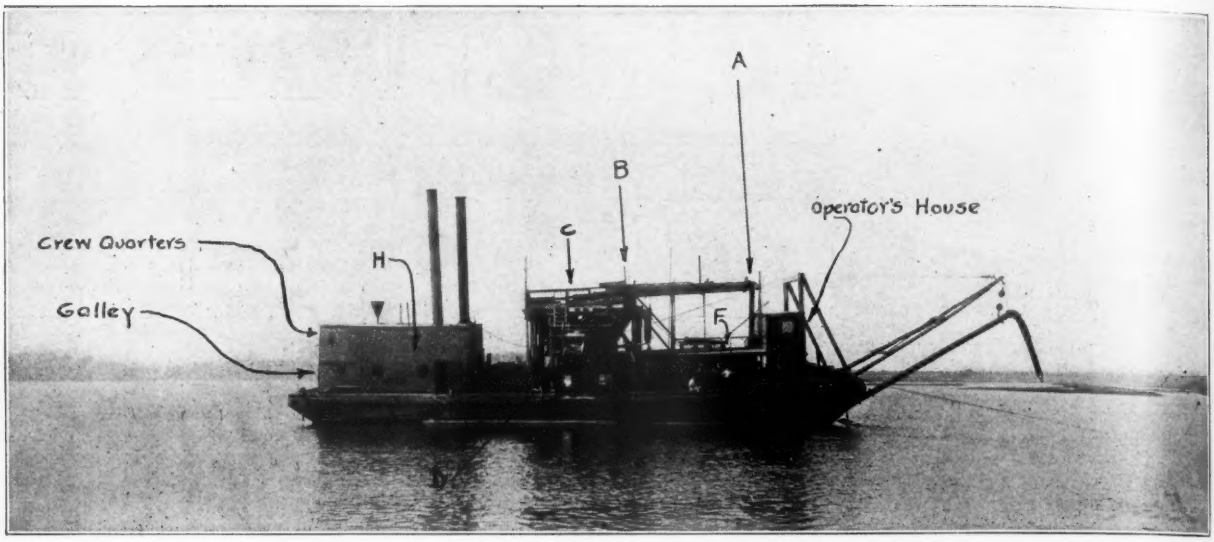
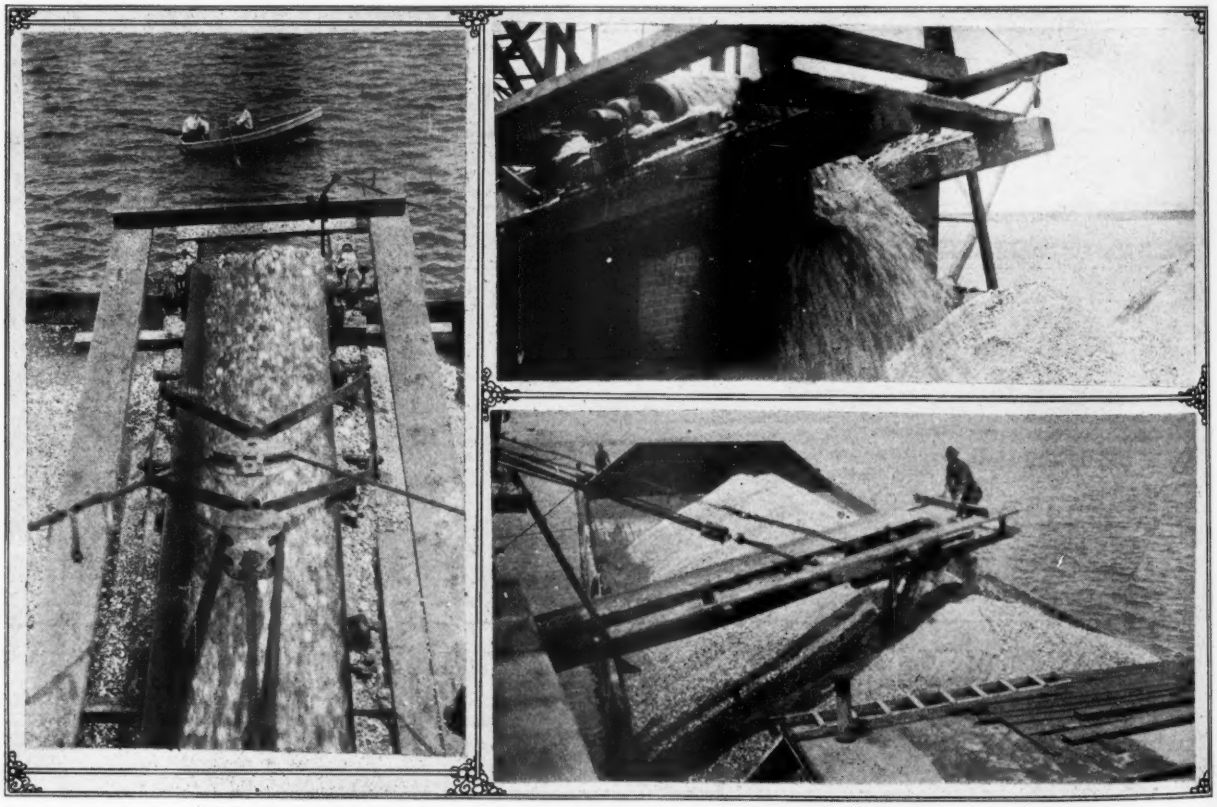


Fig. 3—Close-up view of the new dredge of the Eastern Gravel Corporation

posited by the current over the oyster beds. It was, therefore, necessary to retain all the fine sand in settling tanks to insure that the overflow would be practically clean and this is being done to everyone's satisfaction.

Fig. 1 shows the harbor and entrance channel looking out across the bay protecting the harbor, into Long Island Sound. Fig. 2 shows the gravel dredge as it appears from this bar with Port Jefferson in the distance. Fig. 3 shows the dredge with sand and gravel barges removed to secure a clearer view. The dredging pump and engine are located in the forward and below deck, approximately at point *F* on picture. The boilers are at the after end in the deck house marked *H*. The pump, which is a Morris Machine Works 12-in. heavy duty dredging pump, directly connected to one of their double 11x10-in. vertical high-speed engines, discharges vertically through a 12-in. pipe to the upper end of the fan shaped sloping platform at *A*.

Fig. 4 is a view of the first and second discharge platforms with the screen bars separating the two. Attention is drawn to the two hinged baffle boards on the second platform. These boards are used to distribute the load evenly in the hoppers if the dredge should be listed to either side.



Figs. 7, 8 and 9—Showing various features of the barge-loading mechanism

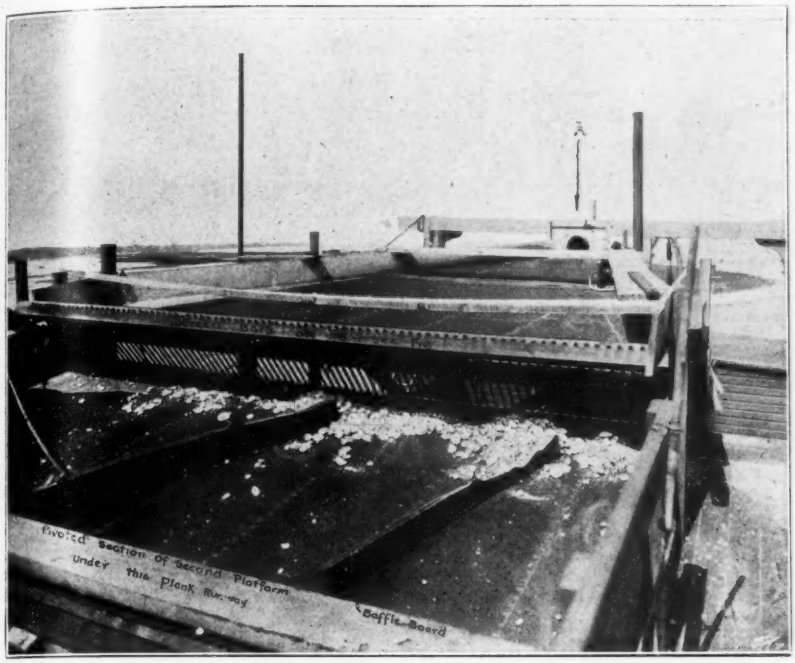


Fig. 4. First and second discharge platforms with screen bars

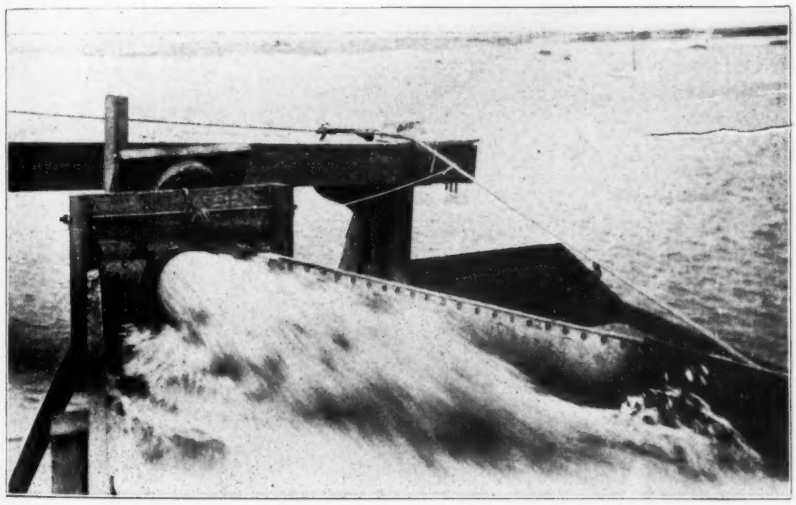


Fig. 5. Discharge at upper end of platform shown in view above

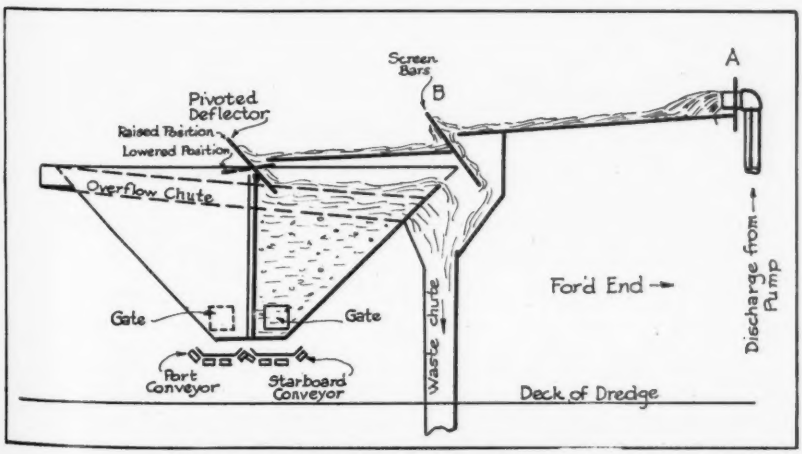


Fig. 6. Flow diagram of the new Perry dredge

Fig. 5 shows this discharge as it belches on to the platform which gradually increases in width from *A* to *B*, Fig. 1. (See Figs. 3 and 4).

In its descent from *A* to *B*, Fig. 3, the stream flattens out until at *B* it is only about 4-in. deep. The stream leaves the platform at *B* and strikes against a series of bars set at an angle of approximately 40 degrees. These bars are spaced so as to exclude all material above 2 inches. The water and smaller material, passing through the bar screen, drops onto a second platform located directly over the settling tank.

A section of the platform above the center of this tank, extending for the full width and about two feet in length is pivoted so that it can be made to deflect the entire discharge into either hopper of the settling tank, or by removing the planks and by mounting a screen on the frame of this pivoted section the coarse aggregate can be rejected by the screen into the near hopper, the water and sand flowing through the screen into the hopper on the far side. Fig. 6 gives the flow diagram from the discharge pipe to the conveyor and shows the scheme of this deflector.

Belt conveyors are installed beneath the hopper at *D* to carry the washed material onto the barges which are made fast alongside of the dredge. The bottom of the hopper clears the deck by 4 ft. The top of the hopper, which is 25 ft. square, is 15 ft. above the deck.

When the writer visited the plant the material being produced was a splendid grade of gravel. Such a small amount of sand was found in that particular deposit that the users preferred to have it mixed in with the gravel, consequently all of the solid material was allowed to fall into the section of the hopper nearer to the pump and was being carried by the starboard belt conveyor to the scow on that side of the dredge. The gravel is prepared principally for the New York market, although some is being shipped to Bridgeport and New Haven, the transportation to any of these places being over an all-water route.

Belt Conveyor a Success

When the design of this plant was being considered there was a question as to whether the material drawn from the bottom of the hopper would be sufficiently dewatered to travel up the conveyor belt successfully. Mr. Perry's confidence that no trouble would be experienced in this respect has been fully justified. The conveyor shown in Fig. 7 is carried on a frame slung from the dredge at an angle of 20 degrees. The belt is 36 in. wide and travels at a speed of 225 ft. per minute. It drops the material on the center line of a 500-yd. deck scow. By means of a baffle arrangement at the outboard end of the conveyor the scow load is very satisfactorily trimmed. Fig. 8 is a view looking directly down from the top of the settling tank onto the conveyor, and shows how evenly the load is distributed on the belt. Fig. 9 is a view

taken of the outboard end of the conveyor to show the stream of gravel dropping from it.

The overflow water from the settling tank is carried in a trough to the forward end of the tank where it meets the chute from the oversize bars. From this point the water and the oversize are dropped by another chute through the bottom of the hull into the bay.

Dredge Details

The discharge from the dredging pipe is 25 ft. above the water level in the bay. The total head against which the pump operates, as shown by the suction and discharge gauges is 60 ft.; the vacuum gauge reading 23 ft. and the pressure gauge corrected for location, 37 ft. The pump speed is 250 r.p.m. and the boiler pressure is set at 140 pounds.

In keeping with the practice on the Niagara River, the dredge pump is driven by simple engines. Aside from the question of first cost, the leading reason for the preference for this type over the more economical compound condensing unit is that the simple engines can be stopped so quickly. This gives a good flush-back through the pipe in case the suction has become choked. They are equally quick in getting up to speed with their load after having been shut down. The suction pipe, which is 14 in., inside diameter, 2 in. larger than the discharge, is led forward from the pump through the bow rake with the center of the pipe about 2 ft. above the water line. Flexibility is obtained in the suction line, outside the hull, by a rubber suction hose. The suction head consists of a piece of straight 14-in. pipe, to the lower end of which are fastened two wrought iron bales which project about 12 in. below the end of the pipe. These bales, which are placed at right angles to each other, are quite similar in shape to wishbones. This combination forms a very simple arrangement and is as effective as any the writer has seen.

The dredge is fully equipped with steam winches for all services, one drum handles the suction pipe wire, four drums carry wires which lead from the four quarters of the dredge to anchors, and there are two steam winches for handling lines to the sand and gravel barges. These, with the 7½x9-in. engine for driving the conveyor and the feed and water pumps, complete the machinery installation.

A special feature of the engine room is the clever arrangement of machinery, which makes it possible for one man to take care of all equipment without difficulty. Fig. 10 is a view of the engine room with the pump engine governor prominent in the center.

Several of the crew live on board the dredge and comfortable quarters are provided for them. Fig. 11 is a view of the galley all set for the next meal.

The crew of the dredge consists of a captain, 1 operator, 1 engineer, 1 fireman, 2 deckhands, 1 cook, 1 gasoline launch operator, 1 man on screening platform and conveyor.

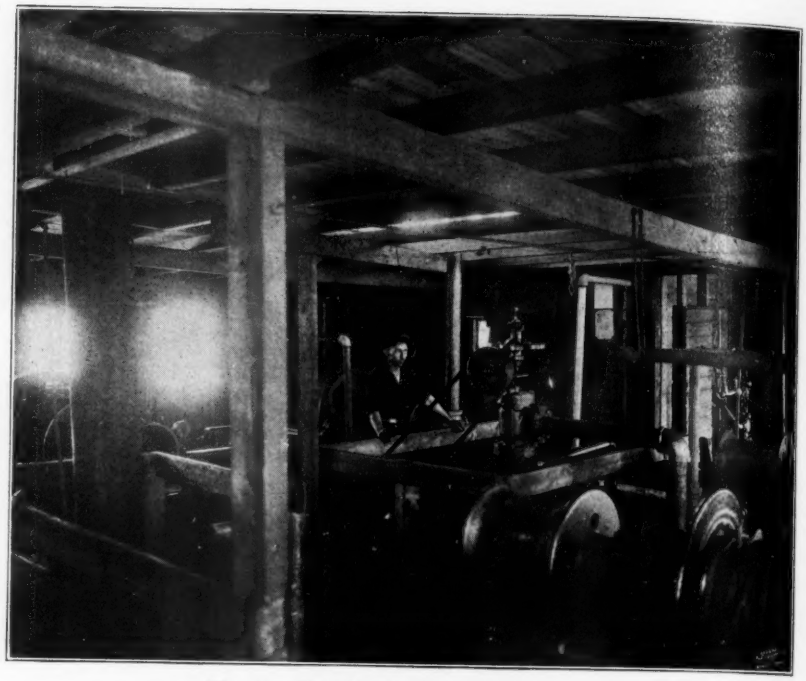


Fig. 10. Showing interior of engine room

Fig. 11. Showing dredge galley set for feeding the crew

A cast-iron dredging pump shell of this design frequently handles 200,000 cu. yd. in such service before replacement becomes necessary. The shell usually outlasts three runners and suction discs. The suction hose may be expected to last but one season. The repairs and replacements to the other equipment are of a very minor nature.

With the exception of the payroll the largest item of expense is for coal, from four to five pounds of coal being required for each yard of material pumped, but even at the present cost of coal this is a small charge per yard of gravel, particularly when it is realized that this produces washed and sized material suitable for the most exacting market.

The dredge loads regularly a 500-cu. yd. scow in from 3 to 3½ hours. One scow of 591 cu. yd. was loaded in 2 hours and 43 minutes, a rate of 219 cu. yd. per hour. As it operates but one shift a day and as scows cannot be brought alongside without some delays, two 500-cu. yd. scows per day is the usual performance. This provides ample time between loads to keep the equipment in excellent condition.

It is pleasing to learn that success has crowned the efforts of those who have had the courage to pioneer in any field, and for this reason the writer has found more than the usual interest in his connection with Mr. Perry's venture. It may not be amiss to recite briefly Mr. Perry's war record to show that even without his extended experience in producing sand and gravel, that success was due him. Just prior to our entry into the war he had joined the Naval Reserves. His marine experience became of immediate value to the country and he was promptly placed in active duty though this required that he abandon the project of a sand and gravel plant at Port Jefferson, which he had barely gotten under operation. Holding a master's license, his promotion in the Navy was rapid, with the result that he became navigating officer on one of the large troop transports, with a temporary commission as Lieutenant Commander. In October of last year his release from the Navy permitted him to begin planning for the plant described above.

Gypsum in the United States

Review of Bulletin No. 697 Just Issued by the United States Geological Survey

THE VALUE of gypsum and gypsum products produced in the United States had increased from $2,750,000 in 1904 to $11,000,000 in 1918, or over 300 per cent. The last publication of the U. S. Geological Survey on the gypsum deposits of this country was printed in 1904, consequently the new bulletin, No. 697, just issued contains much new and valuable information on this rapidly expanding industry.

The principal author of the new bulletin is R. W. Stone, who has contributed a number of articles on this subject in Rock Products during the last few years. Sections of the bulletin relating to the gypsum deposits of the various states have been prepared by the state geologists in a number of instances. Altogether the bulletin is invaluable to all interested in gypsum, which with the increasing use in agriculture promises to become one of the leading fertilizer industries as well as construction material industries.

Distribution of Gypsum Deposits

Gypsum is a hydrous calcium sulphate the chemical formula of which is $CaSO_4 2H_2O$. It is sometimes considered a compound of lime CaO and sulphur trioxide (SO_3). It is much more soluble in water than calcium carbonate, ($CaCO_3$), or limestone, and like limestone it will dissolve in hydrochloric acid, but does not effervesce like limestone (give off bubbles of gas).

When pure gypsum rock is white, but commonly it contains impurities and may be pink, blue, green, gray, or brown, with the color evenly distributed or banded or mottled. Gypsite or earthly gypsum is soft, incoherent, impure gypsum formed on the surface by the evaporation of water in which gypsum and other minerals have been dissolved. Few deposits of gypsite are over 20 ft. thick and the largest known deposits cover only a few acres.

Anhydrite gypsum is calcium sulphate in which the water of crystallization has been driven off. It is found in nature in close association with ordinary gypsum rock. It closely resembles ordinary limestone and is commonly mistaken for it.

Deposits of gypsum rock are widely distributed in this country except in the northeast and southeast states. The most eastern deposits so far discovered are those between Buffalo and Syracuse, New York, which section is the center of a very important plaster industry. The only other deposit in the Atlantic States is in the southwestern corner of Virginia.

Immense deposits occur in the Michigan peninsular and in Ohio at the southern tip of Lake Erie. At Alabaster, Mich., the gypsum bed is 18 to 23 ft. thick and has but a few feet of gravel overburden. It has sufficient thickness to be of commercial value over an area of 25 or 30 square miles.

No other deposits are located east of the Mississippi River. West of the river the well-known deposits at Fort Dodge, Iowa, are possibly the most extensive, or at least have been the most developed. Workable deposits have been located in all of the Western States except North Dakota, Nebraska, Idaho and Washington.

Oklahoma is particularly rich in gypsum. Development of these deposits has been retarded by poor transportation facilities, but the three largest producers of gypsum plaster in the country, the U. S. Gypsum Co., the American Cement Plaster Co. (Beaver Board Co. subsidiary) and the Acme Cement Plaster Co. are all well established in Oklahoma and tremendous developments are promised in the near future.

With the increasing use of gypsum in agriculture the industry will no longer be dependent upon the construction field for practically its entire market and it will not be necessary in order to develop a gypsum deposit to install a complicated plaster mill. The day will doubtless come when gypsum rock pulverizing plants will be dotted over the country just as limestone plants are today. The problems involved in the production, preparation and sale are very similar, except that in many instances gypsum has to be obtained by underground mining instead of open quarry operation.

Car Shortage Curtailing Canada Crushed Stone Industry

CAR SHORTAGE is seriously affecting the shipments of crushed stone and is losing money for the quarries by their inability to fill orders. As a case in point, Crushed Stone, Ltd., Kirkfield, Ont., has a capacity of 1,000 tons per day and ordinarily ships from 18,000 to 20,000 tons per month. Orders require more than this.

G. W. Essery points out, however, that the company is securing only 175 to 200 cars per month instead of 400 to 500 which are required. Crushed Stone, Ltd., shipped only 8,000 tons from their quarry in September as compared with 15,000 tons in June. The company is thus losing $5,000 to $8,000 worth of business per month.

This inability to fill orders in tending to induce provincial and municipal governments to install local crushing plants and only the lack of economy in their operation is keeping them from it. Such plants have no use for certain sizes of stone while the commercial quarry can dispose of all of its product.

A. S. T. M. Lime Committee

ATTENTION has been called to an error in news item in Rock Products, October 23, page 33, under the heading, "A. S. T. M. Lime Committee Elects Officers." The secretary of this committee is now L. H. Hart, manager of the construction department of the National Lime Association, instead of Sidney P. Armsby, as noted.

Hints and Helps for Superintendents

How to Cut Belts Square

By F. D. Rich, Sales Engineer, Crescent Belt Fastener Co., New York

WHEN A BELT RUNS "WOBBLY" or races back and forth across the pulleys, it is not giving its best service nor can it have its longest life. If you have a belt that is repeatedly jumping off the pulleys, you are paying about twice as much as you should for it, because its life is being shortened and you are paying for power that is lost and production that you don't get. You are also repeatedly paying for unnecessary time and labor in fixing things up.

Provided that its ends are cut square and it is joined with care, a belt can be made to run as straight as an arrow if the pulleys are lined up true.

Don't guess at cutting your belt ends. Use a square—always—and use it with care. If you do not use a square, one or both of the ends will be cut unevenly or irregularly, which prevents smooth running. Even the use of a straight edge does not assure the perfect results obtained by using a square, for the slip of a fraction of an inch will bring the belt ends together at an angle, as shown in Fig. 1.

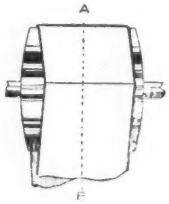


Fig. 1. A belt joined this way cannot run true and evenly

This results in the belt "shimmying" on the pulleys, which is bad for the belt and impairs its service, for as it moves from side to side the line of direct pull, A-B, moves from one side of the belt to the other, imposing shifting and irregular strains, which no belt can stand indefinitely.

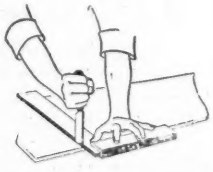


Fig. 2. Hold the square tightly against the edge until you have cut all the way through the belt

Fig. 3. This simple stunt makes square cutting easy and positive

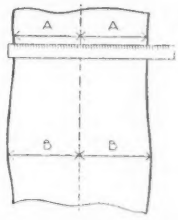


Fig. 4. Find the center by measuring in from the edges of the belt

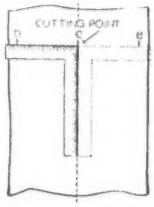


Fig. 5. Square by working from the center line and you won't go wrong

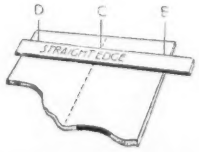


Fig. 6. On wide belts, use a straight edge when you haven't a large enough square

There is only one way to assure correct results. That is to use a belt square and to keep it in place until you have cut all the way through the belt. Don't just scratch the surface and then hack through. Cutting to the square assures an even cut all the way through the belt and all the way across. It means that the belt ends can be brought together in a tight, but evenly-running, flush joint.

For belts up to 15 or 18 in. wide you can use the ordinary square. Press it firmly against the edge of the belt, and, when cutting, hold the knife vertically. (See Fig. 2.)

Be sure your knife is sharp. Wet the point of your knife occasionally, as it cuts more easily when the blade is wet.

When a number of belts have to be cut, a good stunt is to drive two nails in a large block of wood, and against these set the edge of the belt and the edge of the square, as shown in Fig. 3. This prevents either the belt or the square slipping. Some men tack a slip of leather or a piece of old belt on the end of the block to protect the point of the knife as it comes through the belt.

Wide belts are more difficult to square correctly, and the difficulty is often increased by slight variations in width, which throws the square out. To avoid this and assure perfect results the method described below has proven the best.

At any point near where you are going to cut the belt, measure across and find the center, as at A-A, Fig. 4. At any distance back of this, 2 or 3 ft., find the center again, as at B-B. Between these two center points draw a clean, sharp line. This marks the center axis of the belt.

Now, as in Fig. 5, using the square against the center line, trim off the end of the belt, holding the square firmly in position while you cut all the way through. Two small nails driven in on the center line will keep the square from slipping.

For cutting the other end of the belt, find the center line, the same as just described. Then at any point on this line other than where your belt clamps will come, take a point C, as in Fig. 5. Then using the square as illustrated, draw a line, D-C-E, at right angles to the axis, and all the way across from edge to edge. It is sometimes easier to draw this line by marking the points, D and E, and then placing a straight edge through the points, D-C-E, to draw the line. See Fig. 6. Be sure your straight edge is straight, not warped. This line, D-C-E, will constitute a base line to measure from after the belt is in the clamps. Do not cut on this line.

You can determine exactly where you want to cut after the clamps have been put on and the belt brought into position. Then measure forward from the line, D-E, an equal distance on each side of the belt to the cutting point. You can use calipers and measure over the belt clamp or run your ruler through the edges of the clamp. As a matter of convenience, always cut one end of the belt square and get it ready for making the joint before putting the belt into the clamp.

Record of Rock Drills and Drill Work

EFFICIENCY of rock drills at the quarries of the Marble Cliff Quarries Co., Columbus, Ohio, is promoted by records which show the actual performance of every drill. Reports of each drilling machine are made daily by the operators. In this way accurate data may be compiled, showing total number of feet drilled, steel broken, drills sharpened, etc. These data show not only what each machine is doing but whether the operator keeps his drills sharpened or not. The daily records also show the number and condition of drills on hand at all times—a sort of perpetual drill inventory.

DRILL REPORT

Date ..... 19....
Plant ..... Shift .....
Engineers Check No. .....
Helpers Check No. .....

		RATE
Run	Hrs.	
Cut	Ft.	
Delayed	Hrs.	

OPERATION

Changing Rope .....
Splicing Rope .....
Tools Stuck .....
Engine Trouble .....
Changing Bits .....
Loading Holes .....
Springing Holes .....
Repairs .....
Miscellaneous .....
FOREMAN .....

Sample drill record used by the Marble Cliff Quarries Co.

Prolonging the Life of Elevator Belts

THE LIFE of the elevator belts at the Butte-Kansas mill, near Waco, Mo., has been more than doubled by putting strips of belting between the cups and the belt. Old belting is cut into strips about 1¼ in. broad and 5 in. long, and a hole punched at one end of the strip through which the cup bolt passes. Three or four of these, depending on the number of cup bolts, are then used behind each cup. With these strips of old belt behind the cup the belt does not crack along the line of the upper cup edge. When the belt does begin to show wear, the cups are all set in new positions. Sometimes the cups can be reset three times.

A large knife (Fig. 2) has been made, with a lever handle, especially for cutting the old belt into strips. The knife blade comes down between the steel blocks, shown in the cut, which must be set not much farther apart than the thickness of the knife blade.

The experiment has also been tried of crowning some of the elevator pulleys with old belting, which apparently saves both pulleys and elevator belts.—Donald M. Liddell in "Engineering and Mining Journal."

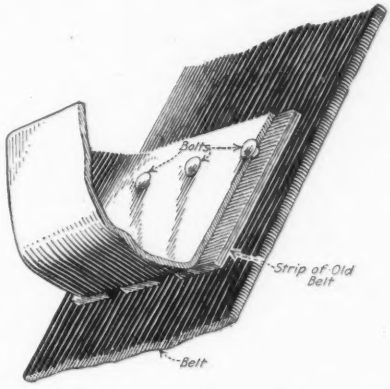


Fig. 1. Method of increasing life of belt conveyor

[A very similar device used at the Toledo, Ohio, plant of the France Slag Co. was described in ROCK PRODUCTS, November 8, 1919, p. 26.]

Quick Lime for Breaking Up Masonry Without Explosives

TO BREAK UP an old stone wall or other masonry, or to knock out a superfluous brick pier without the use of dynamite, slow hand labor is unnecessary. Simply drill a good-sized hole in the wall—making this bottle shaped with as small an opening as possible. Put in quick lime until this hole is almost full and make a tight-fitting wooden plug that can be driven firmly into the opening. Quickly pour in enough water to slake the lime and drive home the plug.

The expansion of the lime as it slakes will exert a tremendous pressure that will easily break up any ordinary piece of masonry.—Bulletin of the National Lime Association.

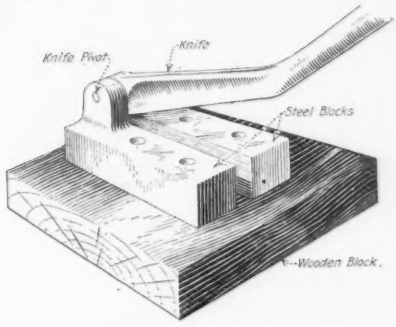


Fig. 2. Device for cutting belt lengths

Quarry Electric Railway

THE VIEW HEREWITH shows one of the limestone quarries of the Pacific Portland Cement Co., Cement, Calif. This quarry is on a side hill above the cement plant and is reached by a long winding grade which skirts around the face of the hill.

This railway is operated by electric locomotives with an overhead trolley system. Standard narrow-gauge mine locomotives, with a full size cab at one end, are used. These handle a string of five or six 3-yd. steel hopper cars of the side-dump type on the 4 per cent grade with ease.

Incidentally the view shows a locomotive crane with clam-shell bucket being used as a quarry stone-handling device. This was used more or less as a makeshift and experience here shows that it is not particularly well adapted for this purpose.

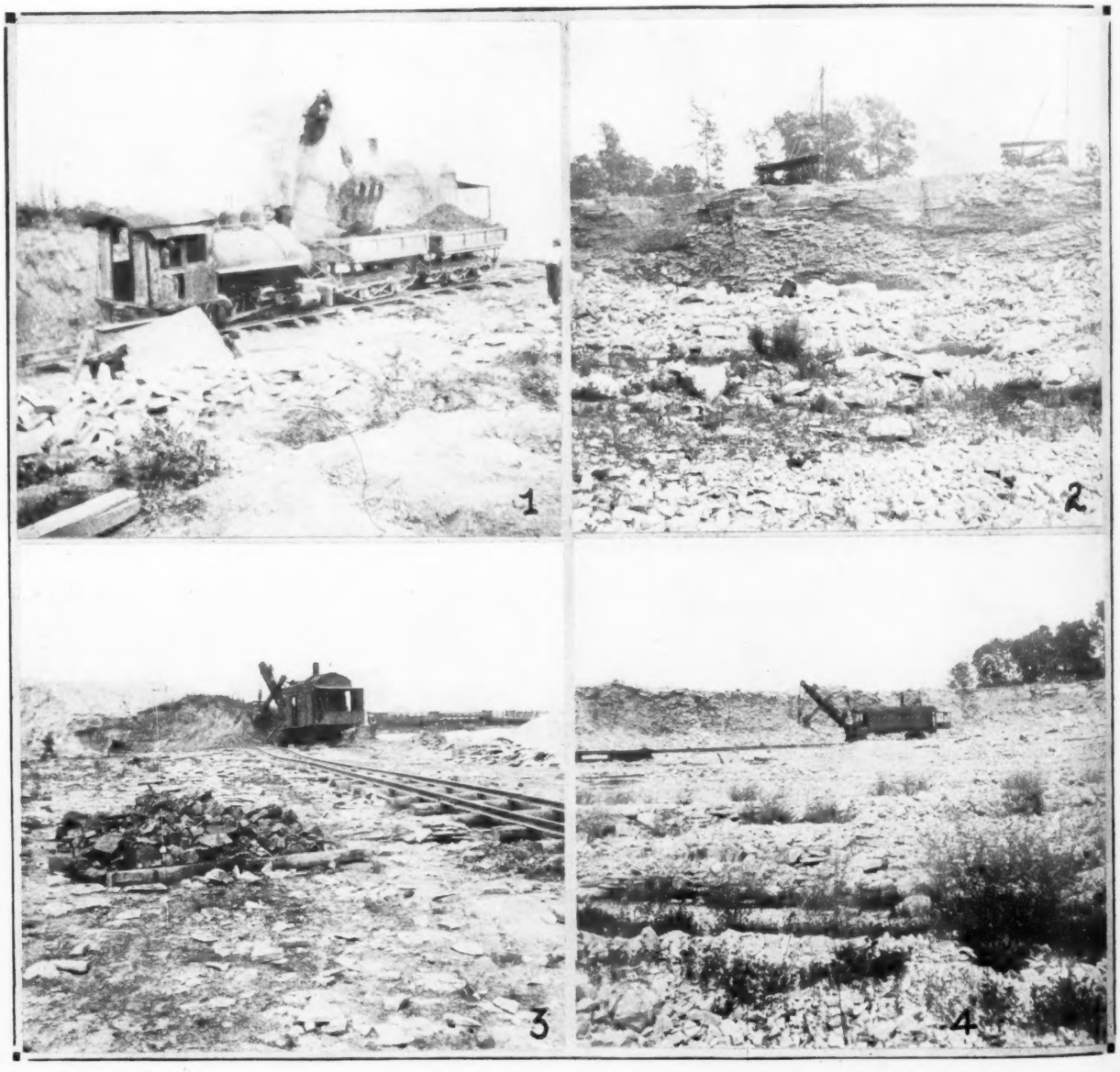
Quarry of the Pacific Portland Cement Co., Cement, Calif.

Stone Plant With Unusual Ground Storage

Higgins Stone Company, Bellevue, Ohio, Has Ground Storage of 250,000 Tons of Crushed Stone and 75,000 Tons of Agricultural Limestone

MUCH HAS BEEN SAID and written by trade association managements and others as to the best way to promote and stimulate a demand for a particular product, but above all else, one thing is, or should be, self-evident, and that is that *service* is the greatest factor in both creating and maintaining a demand for any product. And service implies a stock pile, in small plants as well as large ones.

It may be said that it costs money to maintain a stock pile, but in these days of priorities and embargoes against the rock product industries, whatever the cost of maintaining a stock pile may be, there is one large item that it will offset, namely, the cost of running a plant at half capacity or less, which is bound to occur wherever a stock pile does not exist. In other words, stock put in storage when business is slack to spend a certain amount of money to put



Views 1 and 3 show stripping operations; 2 and 4 are quarry views showing drilling and steam shovel operation

stock in a pile and reclaim it when needed for the sake of giving service and having satisfied customers, which in the long run means increased business.

The above is the gist that one may gather if he visits the Higgins Stone Co. plant at Bellevue, Ohio, and talks to J. A. Moore, president of the company. That he practices what he preaches is quite evident, because of the huge stock pile surrounding the quarry and plant. In fact, it is probably one of the largest stock piles of any one plant in the state, aggregating in all about 250,000 tons of crushed stone and 75,000 tons of agricultural limestone, ready for immediate delivery.

The plant, quarry and equipment of the Higgins Stone Co. is modern in every respect, and the company is obviously a progressive one, as is well shown by the fact that its entire output of agricultural limestone has already been sold for the next three years and only awaits transportation.

Quarry Operation

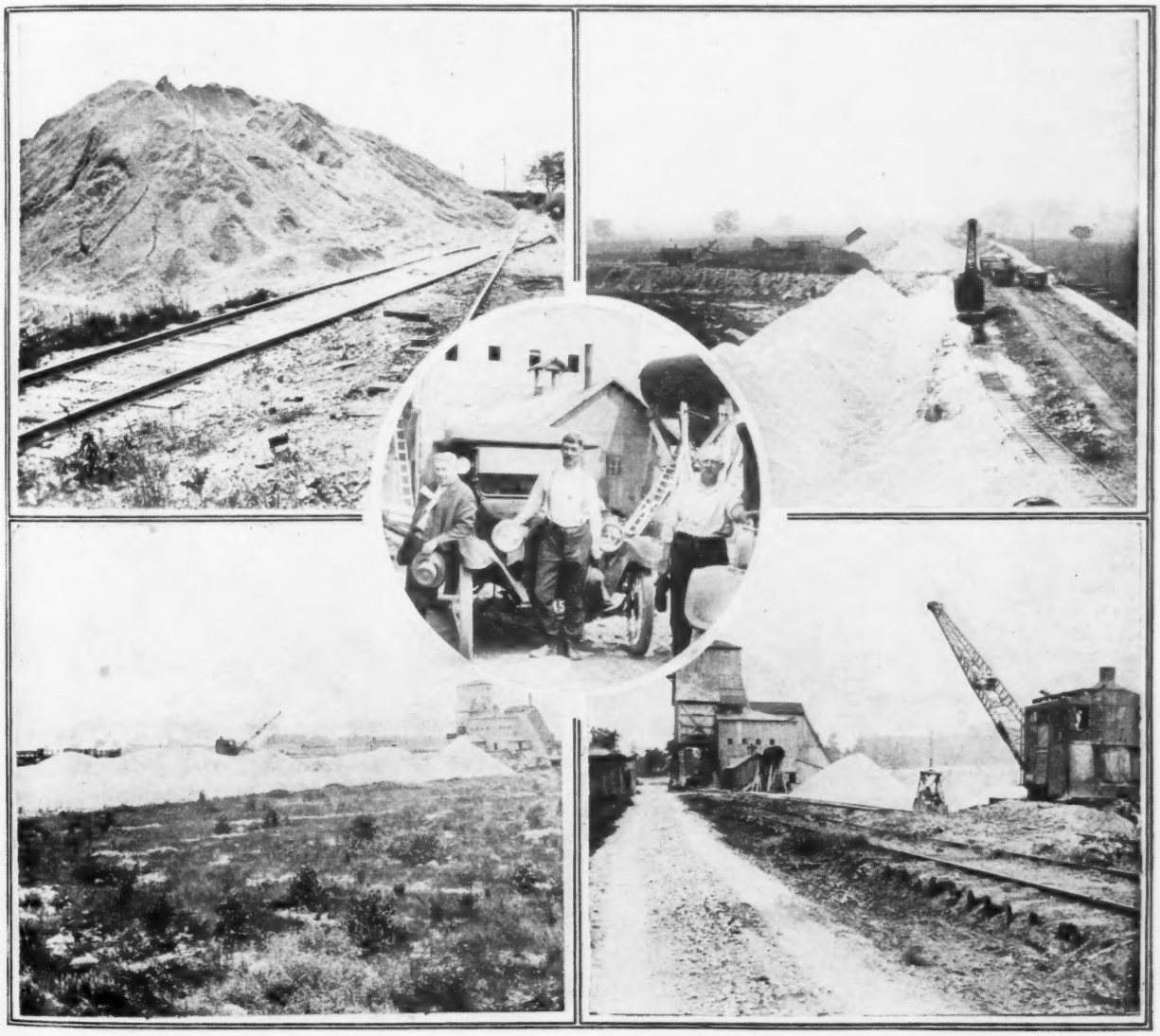
The company possesses a total of 120 acres of land at its present site, and of this only 12 acres has been quarried. The present quarry has a face 26 ft. high and about 1300 ft. in length. It shows no bad fissures or seams and is of an even stratification. The stone is a fairly high calcium limestone, sold mostly for fluxing and ballast purposes. A recent analysis of the stone showed the following:

Calcium Carbonate ($CaCo_3$)	70.92%
Magnesium Carbonate ($MgCo_3$)	9.28%
Silicon Oxide (SiO_2)	1.00 to 3.00%
Iron Oxide (Fe_2O_3)	1.00 to 2.00%

The quarry has about 2 ft. of overburden, consisting mostly of dirt, which is removed by a 45-ton steam shovel, with a dipper of 1½ cu. yd. capacity. The steam shovel loads the dirt into 5 cu. yd. side dump cars, which are then hauled away to the dumping grounds by a small dinkey. This unit is used for removing overburden only.

Two standard well drills are in use here. The holes are about 6 in. in diameter and are drilled about 14 ft. from the face and from 12 to 14 ft. apart. About 100 holes are drilled and prepared for one shot. Blasting is done with dynamite and electrical detonators. Blasts occur about 10 times a season and from 4 to 5 tons of dynamite are used in one shot.

The material is loaded into 5-yd., 36-in. gauge side-dump cars, by a 70-ton railroad type steam shovel, with a 2-cu. yd. dipper, and the haul to the crusher (about 200 ft.) is made by a small dinkey. Since the stone breaks up very nicely and is well separated from the ledge, the shovel operates quickly



Various views showing ground storage of stone and methods of reclamation; in insert, from left to right, J. A. Moore, J. W. Goudy and A. A. Shipman

and effectively and very little pop-shooting has to be resorted to.

Crushing Plant

The initial crusher, which is a No. 8 gyratory is mounted in the quarry about 30 ft. below the normal quarry top level. It is driven by a belt drive from the main line shaft in the secondary crusher plant. The crushed stone is elevated to the crushing plant screen by a pan elevator 70 ft. high with 30-in. buckets.

The rejections from the scalping screen are chuted to a No. 6 gyratory crusher, where the stone is further reduced. From here the stone is taken up and elevated by another pan conveyor 70 ft. high to another scalping screen.

In both cases the sized material from the scalping screens is taken up and elevated to two finishing screens by a pan conveyor 75 ft. high with 26-in. buckets.

Rejections from the No. 6 crusher are chuted to a No. 4 crusher, where further reduction follows, and this time the material is taken right to the finishing screens by another elevator. From the sizing screens the stone falls into the bins, which are of concrete construction throughout.

The plant employs about 35 men and has a capacity of 1500 tons crushed stone per 10-hour day. It makes its own power with two 150-h.p. water-tube boilers which furnish steam for the air compressor and the 150-h.p. engine which drives the main line shaft.

The company also has a 20-ton locomotive crane with a 50-ft. boom and 1½-yd. clamshell bucket, which is used for loading cars from the stock pile. Side-dump cars of 12-cu. yd. capacity are used to transfer the stone from the plant to the stock pile. The spotting of the cars is all done by gravity. The screenings which are sold for agricultural purposes and road work are handled in exactly the same manner as the crushed stone.

Organization

The company has rail connections with the Nickel Plate Lines, New York Central R. R., Cleveland and Lake Erie R. R., and the Pennsylvania Lines. It has been in business for 10 years and has an organization that works in perfect accord.

As mentioned before, J. A. Moore is president of the company, while J. W. Goudy is vice-president and superintendent, and A. A. Shipman, secretary and treasurer. The company has excellent facilities for expansion, and when conditions allow, the officers will undoubtedly avail themselves of this opportunity.

Concrete Roofing Tile as Sand or Quarry Plant Side Line

By D. HELMUTH
President, Concrete Roofing Tile Association, 5120 Sweeney Ave., Cleveland, Ohio

FOR DWELLINGS concrete roofing tile makes a profitable business for the sand producer, either directly or as a subsidiary enterprise, and engineering facts are available today verifying this statement.

Take an ornamental roofing tile weighing about 5 lbs. each or 750 lbs. to each 100 sq. ft. and the tile made of a standard pattern and in permanent colors of red, green, brown and gray—a roof that is unsurpassed in durability and attractiveness, and there is a ready market at your door. The tendency of the times is towards fireproof building materials. No one can dispute the fact that wood or so-called asphalt shingles will burn.

Sand producers have 75% of the raw materials for concrete roofing tile. Why not convert it into a finished ornamental roofing product yourself? It's being done today. It can be done anywhere. The sand producer should investigate this new avenue for the use of his raw materials. Take the present situation, if you, the sand producer, were equipped, you could avoid the shipping of sand, save the freight charges and get an extra profit for your sand. You could even charge yourself, say $1.25 per ton for your sand, put it into the finished product, ornamental roofing tile, and obtain an additional profit of not less than 200% more, than on your sand alone.

The profits are better on an ornamental roofing product than on a building block, structural or hollow tile or cement brick. Why? Because the home owner, the home builder is paying some attention today to design. A green tile roof adds character, so does a red or a brown roof, to any residence.

Then again, can you or anyone else name another ornamental roofing that is durable and fire-safe? The field for these tile is unlimited. Will you avail yourself of this opportunity with your sand, or will you let some other enterprising man grasp it. I personally have manufactured, sold and applied thousands of roofs and I know it can be done and I know there is a great demand for concrete roofing tile anywhere in the United States.

Tests Show Road Wear and Resistance

SUCH IMPORTANT QUESTIONS as how hard a heavy truck pounds a pavement when going at five miles an hour and at 15 miles an hour are being answered by investigators for the Bureau of Public Roads, United States Department of Agriculture, in a series of scientific experiments, which, when completed, promise to be of great value to highway engineers. Already sufficient tests have been made to show that increased speed of a vehicle equipped with hard rubber tires tremendously increases the impact which its wheels make on the roadway where there is any unevenness. On the other hand, where pneumatic tires are used increased speed adds comparatively little to the impact. It has been suggested that these tests will be of great value not only in settling questions of design but may also lead to a rational basis for determining license fees for motor vehicles.

Trucks have been used in these tests varying in size from a 1-ton truck up to a 7½-ton truck carrying an excess load. Each truck was run over a special recording device embedded in a roadway and the impact which resulted when one of the wheels made a 2-inch drop from a ledge built in the surface caused the deformation of specially prepared copper cylinders forming part of the apparatus. The magnitude of the blow was accurately ascertained in pounds by measuring the extent to which the cylinder had been forced out of shape.

Recent tests were made with a 3-ton truck of well-known make loaded with a 4½-ton load so that the total weight on each rear wheel was 7,000 pounds, the unsprung portion (that not supported by the springs) being 1,700 pounds and the sprung portion (that portion supported by the springs) 5,300 pounds. The truck was equipped first with an old solid tire that had been worn down to a thickness of one inch. Then, with exactly the same load on the truck, a wheel was used fitted with a new solid tire 2½ inches in thickness. And finally, the truck was equipped with pneumatic tires 42 by 9 inches and blown to a pressure of 142 pounds per square inch. The following table shows very clearly the bad effect an old tire is likely to have on a road surface and the greatly lessened impact produced by trucks when they are equipped with pneumatic tires.

Approx. Speed	Height	Old Tire	New Tire	Pneumatic Tire
5.7	2"	11,600	9,400	7,100
10.2	2"	18,500	14,100	7,800
14.6	2"	26,500	18,700	8,300

Dewey Cement Company's Crushing Plant

THE CRUSHING PLANT of the Dewey Portland Cement Co., Dewey, Okla., does not have a Fairmount roll crusher as a primary breaker, as erroneously stated in ROCK PRODUCTS, November 6, pages 46 and 47.

The crushing plant equipment, we are informed, consists of an apron feeder, a 60x48-in. "Superior" jaw crusher, and a set of 72-in. diameter by 30-in. face Garfield rolls, all manufactured and installed by the Worthington Pump and Machinery Corporation several years ago.

Plant of the Plymouth Gypsum Company, Fort Dodge

Detached Crushing Plant and Long Aerial Tramway—Hammer Mills for Raw Gypsum, Tube Mills for Finished Product

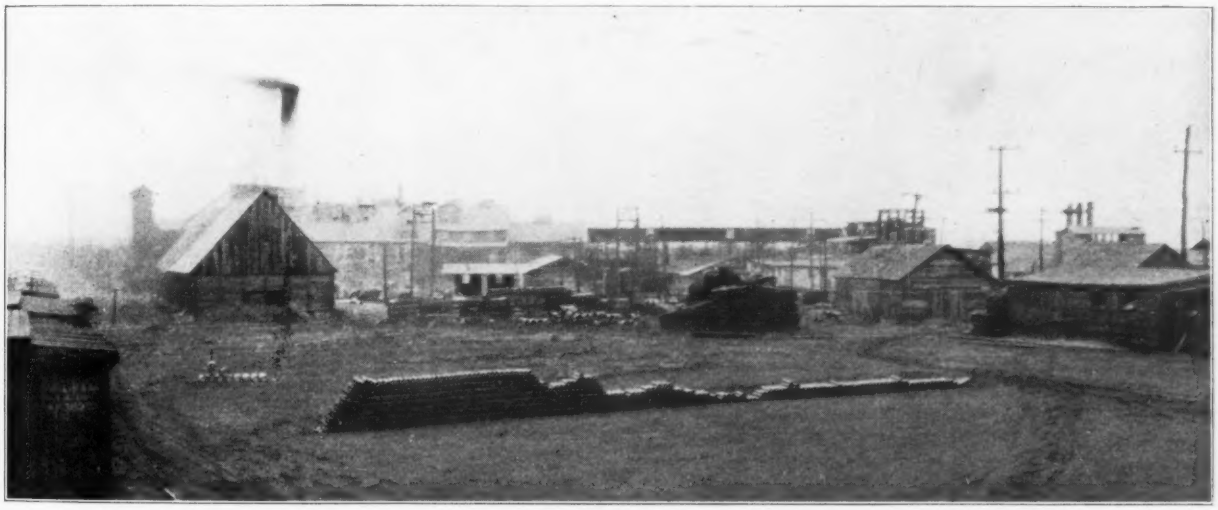
ONE OF THE OLD ESTABLISHED gypsum manufacturers of the Fort Dodge, Iowa, district has a very interesting problem in operation resulting from the fact that the mine is 1½ miles from the plant and that the deposit is such that the hillside or drift mine method is used to remove the material from its bed. Thus the Plymouth Gypsum Co. is able to mine its material without elevating it—the mine cars are brought out of the hillside to a crushing plant which is on a level with the mine floor. A cableway 8,000 ft. long is used to deliver the material from the mine to the manufacturing plant.

Mining Methods

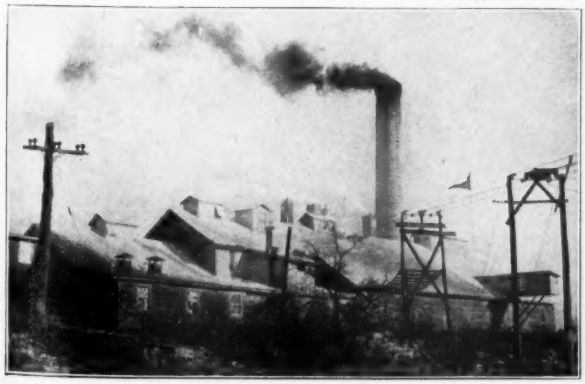
The method used in working this mine is slightly different from that used in most other mines in the vicinity and the results are claimed to be very good. Because of the favorable way in which the rock breaks up upon being shot out of the face, the hand method of loading is used. The miners are paid on a tonnage basis—the rock being weighed just prior to being deposited into the crusher.

The drilling is done with a one-man operated electric auger drill, which cuts a 1⅝-in. hole at the rate of about 16 ft. per hour. The machine is set up near the wall so that three holes may be drilled from one set-up. The miner makes a small nitch in the face with his pick so that the drill will take hold. As it bites in it is fed out with a screw adjustment; drills of three lengths being used to drill a hole 8 ft. deep. The stone is soft and black powder is used for blasting.

One of the views shows the electric locomotive as it is leaving the mine and also the type of mine car and character of the stone as it is mined. Trains of from 12 to 18 cars are made up at the switching centers or Y's in the mine and because of the drift or hillside mining operation the locomotive hauls the rock

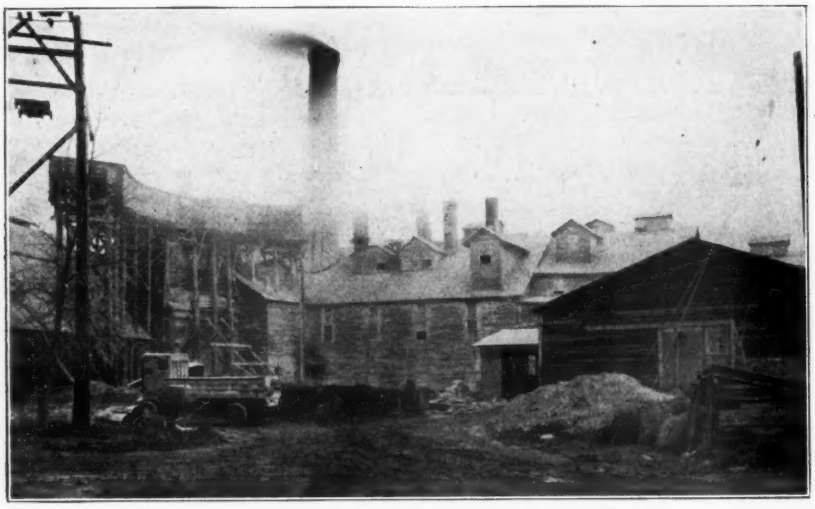


General view of plant of Plymouth Gypsum Co., Ft. Dodge, Iowa



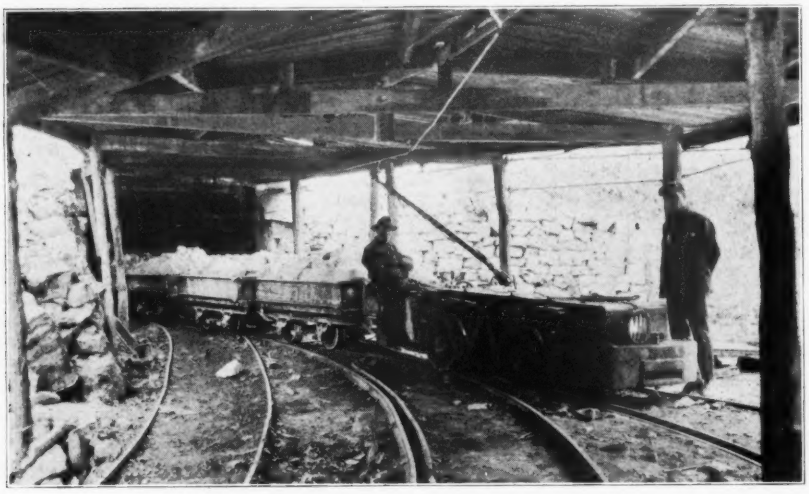
Plymouth plaster mill

Iowana plaster mill



Plymouth plaster mill. Note aerial tramway

Crushing plant at mine



Electric trolley hauling load of cars from mine

out upon the ground level to the crushing plant.

Crushing Plant and Cableway

A gyratory crusher is mounted so that the car loads may be dumped into it from the ground level, where it is reduced to about 1½-in. down material. This is either loaded for cement manufacturers or is sent to the plaster mill. A cableway, 1,800 ft. long, serves the purpose for loading the cement material. The cable car has hinged gates for a bottom and trip arrangement so that when it comes to the end of the run, which is over a chute at the cars, the trip opens the gate and the material drops into the car. The capacity of the cablecar is about 1,000 lbs.

For transporting the stone to the plant there is an aerial cableway between the mine and the mill and small 1,500-lb. cars run on the two cables and are drawn by a third cable. An operator at the mine end of the cableway fills the cars by gravity from a storage bin and when the car is filled a small clutch fastens it to the moving cable and it is drawn along. The cars are filled in rapid succession and fastened to the hauling line so that the spacing is about 200 ft. At the mill they are released and emptied into a pot crusher and then refastened to be sent on the return cableway to the crushing plant. It requires about 20 minutes for a car to make a trip from the mine to the mill. Over 500 tons of gypsum rock is delivered to the plant per day by this cableway.

The pot crusher reduces the rock to ½-in. down and this product is dried in a horizontal rotary coke-fired drier, 66 in.x30 ft. A 75-ton reserve storage bin is used to contain the dried rock before it is pulverized. Two hammer type mills (Williams) are used for the pulverizing and they are said to give entire satisfaction. The approximate fineness attained for the dried material is about 60 per cent through 100-mesh. The pulverized rock is elevated to a 125-ton storage bin above the kettles so that the kettles may be fed from it.

Calcining and Mixing Plant

Four 10-ft. kettles are used, each having a capacity of 15 tons. It requires two hours for the complete operation of filling, calcining and emptying a kettle. A temperature of 338°F. is attained by the coal burning-furnaces under the kettles. A casing or housing about the kettles allows the gases to circulate entirely around them and four 14-in. flues which pass through the center of the kettles allow the heat to get into the center of the mass. At no time, however, does the hot gas come in contact with the material.

In the finishing process the material is ground and screened so that about 80

per cent will pass a 100-mesh screen. The completely ground gypsum is conveyed to a bin above the mixing machines in the packing house. Here the retarder and hair and wood fibre are added. The mixing machine consists of a hopper mounted on scales, into which a certain amount of the ground gypsum is run and the materials are properly proportioned.

When a batch is mixed it is moved by gravity and as fast as it is sacked it is trucked away to cars for shipment.

In some materials a filler of sand or wood fiber is added so that when the product gets to the job all it needs is the addition of water. One of the views shows the type of machine used for making the wood fibre. The blocks or sections of logs are mounted as shown and the bed which holds them rotates, bringing the wood in contact with sets of circular saws which shred the fibres. A suction provided below the saws draws the fibre into a pipe and blows it to a wood fibre bin.

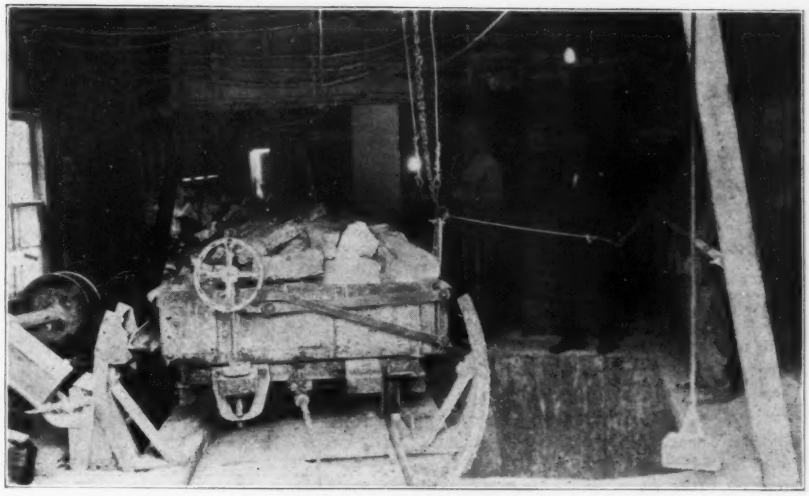
All the machinery in the mill is electrically operated. In most cases machines of the same type are shaft driven by one motor. The plant has a capacity of 290 tons of finished product in an eight-hour day. About 30 tons of this is used in the wall-board and plaster-board plant which is also on the company's property.

Plaster board is a combination of plaster and building paper. The plaster or mortar is made in a belt mixing machine. The bulk gypsum from the mill is delivered to a bin over the mixer and it is fed onto a short endless belt which is a part of the machine. Water is added and the material is thoroughly mixed as it passes along on the belt.

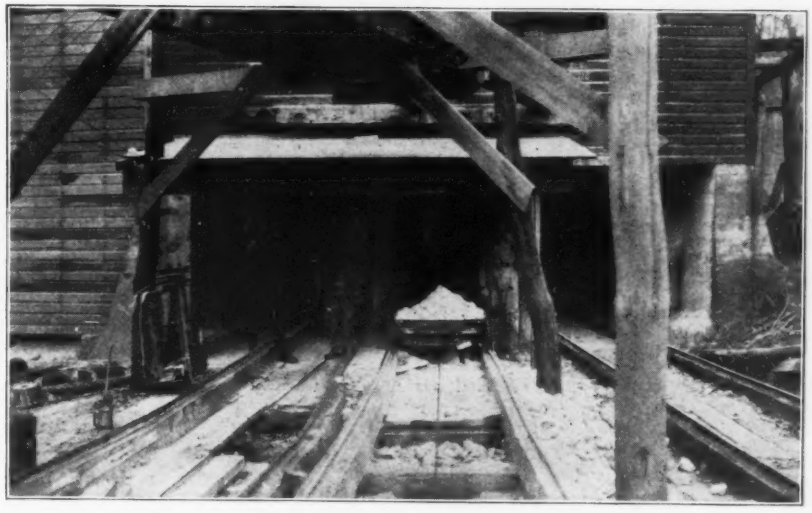
A second wide belt runs at right angles to the mixer belt upon which a ply of building paper is unrolled. The plaster from the mixer is deposited upon this layer of paper and another layer of paper is unrolled on top of the plaster so that the plaster is sandwiched in between. A small trip folds one edge of the paper under the other so that the board has a uniform width and smooth edge. A roller presses it to a constant width and a pair of automatic shears cuts it into any required length.

At the end of the belt the sections of board which are now sufficiently set to handle are transferred to kiln cars and moved into a large steam coil heated kiln room. After being subjected to this heat for 48 hours they are removed as a white hard wall board.

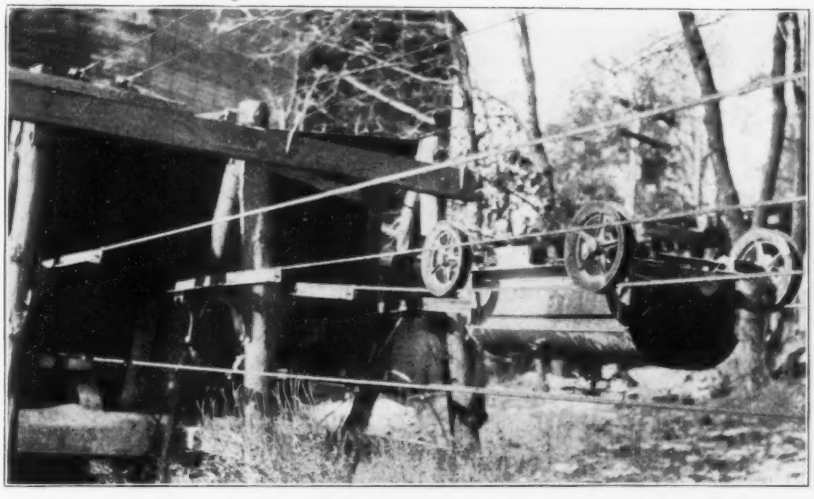
The products made by the Plymouth Gypsum Co. include hard wall plaster and finishes, wall board and plaster board, land plaster, stucco and plaster of paris, fireproof gypsum tile and retarder for stucco.



Electric rotary car dumper



Filling tramcars with gypsum rock



Type of tramcar used

New Mill

The company is now completing a new gypsum mill which will be known as the Iowana Gypsum Products Co. The rock will be brought to this mill by cableway from the mine across the river, the total distance being approximately one-quarter mile. The type car used in this section of cableway is different from the cars used in the old mill, in that the body is suspended from the wheels. It operates, however, in the same manner as the old type car.

The rock from the cars will be emptied into mammoth storage bins, which are situated right in the mill. The rock is then discharged as desired into a pot crusher, which reduces to ½-in. and down. The rock from the crusher goes to a bin situated over the drier. Here by means of an automatic feed it goes to a 66-in.x35-ft. coke-fired horizontal rotary drier. After being thoroughly dried the rock is reclaimed and elevated to large reserve storage bins, which contain only dried rock ready for pulverizing.

As in the old plant, two Williams mills are used for pulverizing, giving the same desired fineness. It is then elevated again to large storage bins, directly above the kettles.

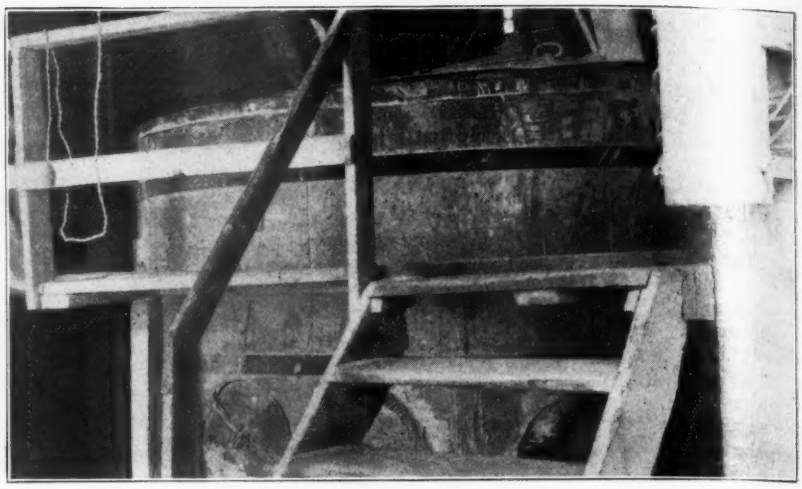
Calcining and Mixing Plant

Here again, as in the old plant, four 10-ft. kettles are used for calcining. The kettles are operated exactly the same as in the old plant. After calcination the material discharges into hot-pits and then by means of screw conveyors and elevators is discharged into bins over the tube mills, which are used for the final regrinding. There are two such tube mills each 66-in.x20-ft. using steel balls.

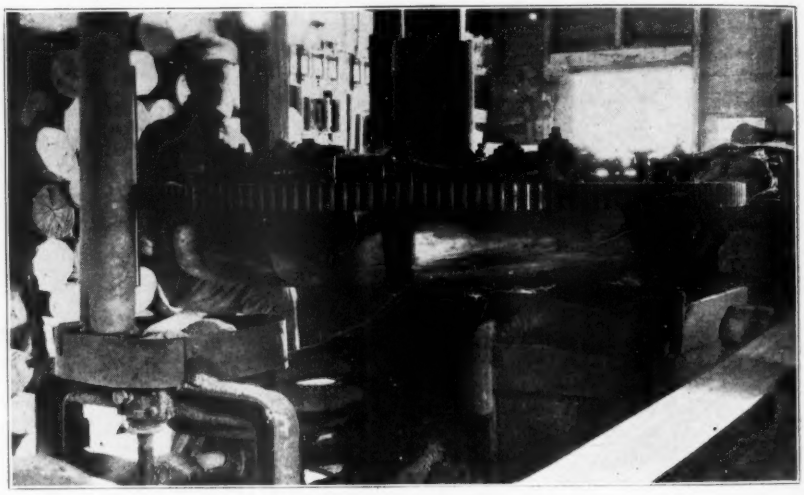
The material from the mills is again screw-conveyed and elevated to storage bins above the mixers in the packing department. Here the retarder, fiber and other ingredients are added. It is then put in the mixing machine from which it is sacked and immediately trucked away to storage or to cars for shipment.

The officers of the company are L. E. Armstrong, president and treasurer; M. D. O'Connell, vice-president; A. J. Armstrong, secretary, and H. J. Osterlund, sales manager.

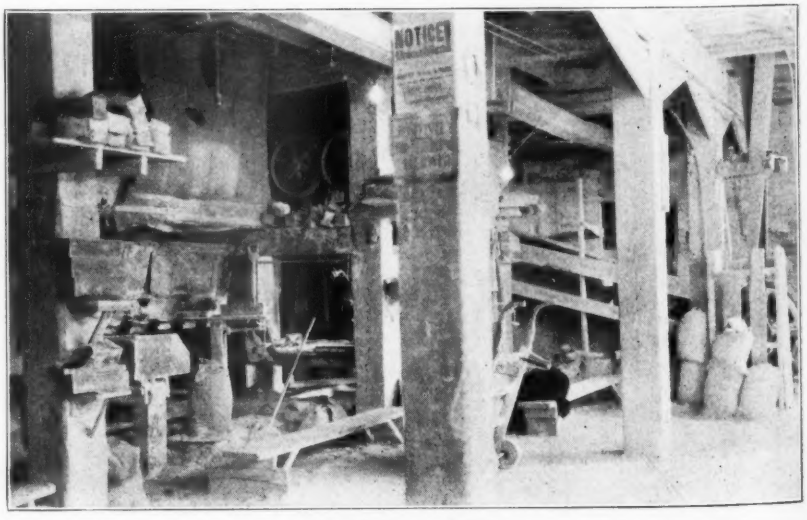
The new plant will be run on the unit system of operation and will have a capacity of 600 tons of plaster per day. The officers of the Iowana Gypsum Products Co. are L. E. Armstrong, president and treasurer; A. J. Armstrong, vice-president; J. M. Norton, secretary, and H. J. Osterlund, sales-manager.



Calcining kettle



Making wood fibre



Sacking the plaster

French Quarry Industries

RECENT STATISTICS show that the French quarry industries are about 80 per cent recovered from destruction wrought by the Germans.

Practical Chemistry for Lime and Cement Manufacturers

XVII—Calculation of the Heating Value of Fuel from Its Analysis

By Richard K. Meade, M. S.
Consulting Chemical and Industrial Engineer, 11-13 E. Fayette St., Baltimore, Md.

THE CALCULATION of the heating value of fuel from its ultimate analysis is easy and gives fairly accurate results. The analysis itself, however, is long and tedious and requires much apparatus. If this has to be bought or any number of determinations have to be made, it will certainly pay better in the long run to get a good calorimeter and determine the heating values of fuel by direct combustion. The calculation of the heating value from an ultimate analysis is simple and is based on the heat units produced by the elements carbon, hydrogen and sulphur on being completely burned to carbon dioxide, water, and sulphur dioxide respectively.

Referring to the table of heats of formation we find the following are the heat values of the elements mentioned; 12 kilograms of carbon burned to carbon dioxide produce 97,200 calories, hence 1 kilogram will produce 8100 calories; similarly 2 kilograms of hydrogen will produce 69,000 calories or 1 kilogram 34,500 calories, also 32 kilograms of sulphur will produce 69,260 calories and one kilogram 2164 calories. Multiplying the values by 5/9 we have

1 pound Carbon = 14,580 B.t.u.
1 pound Hydrogen = 62,100 B.t.u.
1 pound Sulphur = 3,895 B.t.u.

Since the oxygen combines with one-eighth of its weight of hydrogen it is necessary to deduct from the percentage of hydrogen found in the fuel one-eighth of the oxygen found, since this hydrogen is already combined with the oxygen and hence produces no heat.

From these figures we have:

Heating power expressed in B.t.u. per pound of fuel = $14{,}580 \times C + 62{,}100 \times (H - \frac{1}{8} O) + 3{,}895 \times S$.

Example.—A sample of Pittsburgh bituminous coal has the following analysis:

Carbon	75.10
Hydrogen	4.80
Oxygen	7.90
Sulphur	1.50

Its heating value per pound in B.t.u. = $14{,}580 \times 0.751 + 62{,}100 \left(0.048 - \frac{0.079}{8}\right) + 3{,}895 \times 0.015 = 10{,}950 + 2360 + 58 = 13{,}368$

The heating value of coke, anthracite and bituminous coals can be calculated with sufficient accuracy for most purposes by this method, the results seldom differing by more than 2 per cent from those obtained with the calorimeter.

Calorific Value of Coal From a Proximate Analysis

There are several formulas, which while not strictly scientific, at the same time have been derived by experience and the study of fuel and which will be found convenient for calculating the heating value of fuels for ordinary use. I am giving two of these formulas. Goutal has proposed the following formula for calculating the calorific power of a fuel from its proximate analysis:

Calorific power (Calories per kilo) $= 82C + aV$

B.t.u. per pound $= 148C + 1.8\,aV$

Where C = percentage of fixed carbon, V = percentage of volatile combustible matter, and a = a variable factor depending on the ratio of volatile matter to the total combustible matter in the coal. The values of a are given in the table below. First find the ratio of V to $V + C$, as follows——

$$\frac{V \times 100}{C + V}$$

GOUTAL'S FACTORS

$\frac{V \times 100}{C+V}$	a	$\frac{V \times 100}{C+V}$	a	$\frac{V \times 100}{C+V}$	a
1–4	100	16	115	28	100
5	145	17	113	29	99
6	142	18	112	30	98
7	139	19	110	31	97
8	136	20	109	32	97
9	133	21	108	33	96
10	130	22	107	34	95
11	127	23	105	35	94
12	124	24	104	36	91
13	122	25	103	37	88
14	120	26	102	38	85
				39	82
15	117	27	101	40	80

Example.—A steam coal has the following analysis:

Moisture	1.03% =
Volatile matter (V)	20.80
Fixed carbon (C)	71.67
Ash	6.50
Sulphur	1.10

Ratio of volatile matter to total combustible matter $\frac{V \times 100}{C + V} = \frac{20.8 \times 100}{71.67 + 20.8} = 22.5$.

Hence from the above table $a = 106$ and substituting in the formula, Calorific Power $= 82 \times 71.67 + 106 \times 20.8 =$ 8,122 Cal. or multiplying by 9/5 or using the second formula 14,620 B.t.u.

F. Haas, of the West Virginia Geological Survey, has proposed the following formula for calculating the heating value of a coal from its proximate analysis:

Calorific Power (B.t.u. per 100 lbs) = 15,675 (100—per cent ash,—per cent. sulphur,—per cent moisture) + 4,050 × per cent. sulphur.

Results obtained by these formula are close enough for rough heat calculations, etc.

Example.—Applying this formula to the coal given in the example above, we have:

Calorific power B.t.u. per 100 pounds = 15,675 (100—6.50—1.10—1.03) + 4,050 × 1.10 = 1,436,679 B.t.u. per 100 lbs. or 14,367 B.t.u. per lb. A difference of 1.7 per cent of the value given by Goutal's formula, which is close agreement.

Calorific Value of Liquid Fuels from Specific Gravity—The heating value of fuel oil may be roughly determined by means of the formula (Sherman and Krapff's):

B.t.u. per lb. = 18,650 + 40 × (Baume reading—10.)

Example.—A Russian crude oil has a specific gravity of 0.877. This is equivalent to 30° Be. Hence applying the above formula we have:

B.t.u. per lb. = 18,650 + 40 × (30—10) = 19,400

By actual determination, the heating value was found to be 19,500 B.t.u. per lb.

Calorific Value of Gaseous Fuels from Analysis:—To calculate the heat units which will be produced by the combustion of a gas from its analysis, multiply the percentage of each constituent by the heating value of this constituent as shown by the following table. Add the products so obtained and divide the sum by 100. The quotient will be the heating value of the gas.

HEATING VALUE OF GASES

Gas	*B.t.u per cu. ft.*
Acetylene	1,846
Carbon monoxide	3,869
Ethylene (Olefiant gas)	1,728
Hydrogen	294
Methane	966

Example.—Iola, Kan., natural gas contains oxygen, 0.45 per cent, nitrogen 7.76 per cent, carbon monoxide, 1.23 per

cent, carbon dioxide, 0.90 per cent, methane, 89.66 per cent. What is the heating value? The only gases which burn are of course carbon monoxide and methane, the nitrogen and carbon dioxide being inactive.

Heating Value	B.t.u. per 100 cu. ft.
Carbon monoxide.....	$1.23 \times 344 =$ 423.12
Methane	$89.66 \times 966 =$ 86,611.56
Total	87,034.68

Heating value = 87,035 ÷ 100 = 870 B.t.u. per cu. ft.

Since the heating value of producer gas may be measured by means of gas analysis, every lime manufacturer operating a producer, should obtain a gas apparatus and frequently check the composition of his gas. Any intelligent man can learn to make accurate gas analyses with some of the simpler forms of apparatus—such as the Hay's type. A study of the conditions under which the producer gives the best gas should be made in every plant. By doing this the manufacturer learns how to use his fuel to best advantage.

[The article in the next issue of Rock Products by Mr. Meade will be on "Rotary Lime Kilns," after which this series will continue.—Editor.]

British Government Acquires Title to Pacific Island Phosphate Deposits

THE SHAREHOLDERS of the Pacific Phosphate Co. have recently ratified the agreement arrived at between the directors of the company and the Imperial Australian and New Zealand Government to dispose of their rights in the Nauru and Ocean Islands. Lord Balfour, who presided, recapitulated the details of the arrangement, stating that the company held concessions and conferred exclusive rights until the year 2000 to exploit the phosphate deposits in Nauru and Ocean Islands—formerly possessed by Germany. Soon after the outbreak of the war it was, at the request of the British Government, occupied by Australian forces, and placed under the control of a British administrator. Some time before and during the peace conference in Paris a controversy arose over the possession of the phosphate deposits in Nauru.

The Nauru mandate was given to the British Empire in May, 1919. The mandate did not and could not invalidate the company's rights, and therefore communications were at once opened, which had for the object the buying out of the company's interests. In July, 1919, an agreement was made by the governments of the United Kingdom, Australia and New Zealand, under which the title to the phosphate deposits in Nauru, and to all lands, buildings, plant and equipment on the island used in connection with the working of the island should be vested in commissioners, and any right, title or interest which the company might have in the phosphate deposits, lands, buildings, etc., should be converted into a claim for compensation at a fair valuation.

Ultimately the three governments involved undertook to pay to the company £3,500,000 for its rights and properties in the two islands; while with the exception of a few senior members the governments were to take over the staff and employees of the company. Lord Balfour referred to the great value of the properties, and said the possession of such enormous phosphate deposits was of the greatest importance to the Empire.

It was decided to vote £150,000 out of the proceeds of the sale for distribution among the directors, managing directors and other members of the staff, the opinion being generally expressed that the price paid by the governments was a fair and satisfactory one.

Selling Points for Agricultural Limestone and Phosphate

IN POT AND WATER CULTURE EXPERIMENTS with wheat, conducted at the Kentucky Experiment Station to demonstrate the effect of manganese on the growth of wheat and studies to determine a source of this element, it was found that manganese in suitable dilution stimulated the growth of wheat, increased the size and nitrogen content of the grain, and apparently performed an important function in the normal growth and development of the plant.

Chemical examinations of a number of different agricultural limestones, raw rock phosphate, and basic slag showed that the first two materials contained very little manganese, but that basic slag contains about 100 lbs. of manganese to the ton. "It is possible that some of the benefit to crops resulting from the use of this fertilizer, on certain soils, may be due to this element."

The report above suggests the value of an accurate chemical analysis of agricultural limestone and rock phosphate, to be used as a talking point in sales and promotional work. For if one limestone or phosphate contains an appreciable amount of manganese and others in the same territory do not, it is obvious that the limestone or phosphate which does carry this element has a valuable selling point for wheat fertilization that the others do not have.

(Manganese mentioned in this report must not be confused with magnesium which is another chemical element very commonly found in limestones.)

As the knowledge of soil chemistry and fertilizers is extended doubtless the particular value of other chemical elements found in some limestones and phosphates will be demonstrated and selling arguments can be built upon such knowledge. A good example is the case of an Eastern lime plant which during the war, and the period of scarcity in potash, made a fine selling argument on the fact that its agricultural lime contained an appreciable amount of available potash.

Sulphur in Soil Increases the Availability of Rock Phosphate

EXPERIMENTS reported by A. M. Peter in a Kentucky agricultural experiment station report on the composting of sulphur with soil, phosphate rock, and manure, using soil from the station farm, showed that nearly three-fourths of the phosphate added or already present in the soil was finally rendered soluble in ammonium citrate solution, although the action was slow in beginning and did not progress properly until after the addition of sulfofying organisms. These experiments are considered to indicate the practicability of this method for producing acid phosphate on the farm. Laboratory experiments with eight Kentucky soils of different types showed that sulphur added at the rate of 500 parts to the million of soil was nearly all converted into sulphate in a month. There was little difference in the sulfofying power of the several soils, none of them exceeding the station farm soil in this property.

This explains why rock phosphate and gypsum (land plaster) used in conjunction give the best results. Rock phosphate contains twice as much phosphoric acid per ton as commercial acid phosphate. If gypsum or sulphur will render this phosphoric acid available for plant food it is easy to see why rock phosphate at $12 or $15 per ton is worth more to the farmer than acid phosphate, which is only half as concentrated, at $25 to $30 per ton. The total cost of a ton of rock phosphate and a ton of gypsum would be about $18 f.o.b. plant, as against $30 for acid phosphate, and the farmer would get about twice as much of both sulphur and phosphoric acid for the smaller price.

Relative Value of Various Forms of Lime

EXPERIMENTS, to compare the values of different forms of lime on acid soil, made in Maryland and reported by A. G. McCall, showed that raw oyster shell gave a slightly greater yield of wheat than the raw limestone, but for the corn the increase was in favor of the limestone. Burned limestone gave a larger yield of wheat but a smaller yield of corn. Except for a slight difference in favor of the burned forms, there seemed to be little room for choice.

Burning Limestone for Both Lime and Carbonic Acid Gas

II—Method of Starting Kiln—Chemistry of Lime Burning

LIME-BURNING in the beet sugar industry is done with pot kilns of the type described in ROCK PRODUCTS, November 6, 1920. Coke is used for fuel in order to insure a purer lime and also a purer carbon dioxide gas than would be the case with coal fuel.

Method of Starting Up a Lime Kiln

The usual method of starting a lime kiln is as follows: The bottom is filled to a depth of about 6 ft. with kindling wood, which is supported by a layer of coarse limestone, over the rails, to keep them from getting too hot. On top of the kindling there is placed a layer of about 2,000 to 3,000 pounds of coke, and above this about 10 tons of limestone, mixed with 15 per cent coke. The kiln is then filled about two-thirds full with limestone, mixed with 10 per cent, or the customary amount, of coke. Care should be taken to fill the kiln first with limestone of uniform size, so as to get an even draft. The kiln is lighted with torches, and allowed to burn with natural draft, or with the booster fan, until the fire reaches the limestone, or until it is necessary to speed up the kilns to produce lime, when the pumps are started and the regular operation of the kiln begins.

Chemistry of Lime Burning

The burning of limestone to lime in the Belgian kiln, using inter-mixed coke as a fuel, follows definite and quite simple chemical reactions. Knowing these reactions, the molecular weights of the various compounds involved, the relative weights of the gaseous products, and the weights of one or both of the raw materials, it is possible to calculate the weights and volumes of the products. In order to make the calculations readily understandable, we shall for the time being ignore the influence of any impurities which might be present in the limestone or coke, and assume that we are dealing with pure calcium carbonate on the one hand, and pure carbon on the other.

There are two basic and a number of minor reactions involved in the burning of lime, the basic ones being, the thermal decomposition of calcium carbonate into calcium oxide, or quick lime, and carbon dioxide gas; the second reaction is that of the burning of carbon in oxygen diluted with the nitrogen of the air.

The minor reactions include, the decomposition of a portion of the carbon dioxide in the presence of incandescent carbon into two parts or volumes of carbon monoxide; the reactions of producing calcium silicates, ferrates and aluminates from the impurities originating in the limestone, the coke, and the refractory lining of the kiln; the formation of sulphuric acid from the sulphur of the coke, or from calcium sulphate, which is sometimes present in limestone.

Every element or compound has a certain chemical weight, or combining weight, which is distinct from the absolute weight. This combining weight is the weight of a molecule of the substance as compared with the weight of a molecule of hydrogen, and indicates the relative proportions in which the substances occur in compounds, etc. The following are the principal substances which need to be considered in a preliminary study of the lime kiln, their formulas and atomic weights also being given for reference.

Substance	*Formula*	*Atomic or Molecular Weight*
Calcium Carbonate	$CaCO_3$	100
Calcium Oxide	CaO	56
Carbon Dioxide	CO_2	44
Carbon	C	12
Oxygen	O	16

The reactions are the following:

Decomposition of $CaCO_3$:

$$\underset{100}{CaCO_3} \text{ plus heat} = \underset{56}{CaO} \text{ plus } \underset{44}{CO_2}$$

Burning of Carbon:

$$\underset{12}{C} \text{ plus } \underset{32}{2(O)} = \underset{44}{CO_2}$$

Decomposition of CO_2:

$$\underset{44}{CO_2} \text{ plus } \underset{12}{C} = \underset{2(28)}{2(CO)}$$

Knowing that the reactions take place in proportion to the atomic weights and having given the absolute weights of calcium carbonate and carbon, we can calculate the absolute weights of calcium oxide and carbon dioxide.

For simplicity and because practically all the chemical values are commonly calculated in the metric system, we shall do so in this case and refer to kilograms and cubic meters instead of pounds and cubic feet. The weight of a cubic meter of each of the principal gases has been carefully determined by scientists as follows:

Gas	*Wt. of One Cu. Meter in Kilograms*
Oxygen	1.4300
Carbon dioxide	1.9663
Nitrogen	1.2552
Carbon monoxide	1.2515
Air (O and N)	1.2939

Since the gas is analyzed by volume with the Orsat or similar apparatus, it is customary to express the composition of the gas by volume, and since any gas expands with an increase of temperature, or a lowering of the absolute pressure, the standard volume is taken as at Zero C. and 760 millimeters pressure, and for any variation from these conditions, due allowance is made.

Making use, then, of the atomic weights of the various substances, the weights of a cubic meter of the respective gases, and knowing the weight of a product or a raw material, a series of factors may be derived covering the whole field of lime burning, which may be used in calculating the unknowns for any combination.

TABLE OF FACTORS FOR LIME KILN CALCULATIONS

1. Weight of calcium carbonate $\times$ 0.44 = Weight of CO_2 from same.
2. Weight of calcium carbonate $\times$ 0.56 = Weight of CaO from same.
3. Volume of CO_2 from $CaCO_3$ = 0.44/1.9663 or 0.22377 cubic meter per kilogram.
4. Weight of calcium carbonate in kilograms $\times$ 0.22377 = Volume of CO_2 in cubic meters.
5. Weight of carbon in coke $\times$ 44/12 or 3.6667 = Weight of CO_2 from coke.
6. 3.6667/1.9663 = 1.8647 cubic meters of CO_2 from one kilogram of carbon.
7. 1 kilogram of carbon therefore results in 1.8647 cubic meters of CO_2.
8. Weight of nitrogen accompanying the oxygen used for combustion of the carbon in the coke is 32/12 $\times$ 77/23 $\times$ weight of carbon = 8.928 $\times$ weight of carbon.
9. Volume of nitrogen equivalent to unit weight of carbon is 8.928/1.2552 = 7.118 cubic meters of nitrogen for each kilogram of carbon.
10. Then—
    - 0.22377 $\times$ Kilograms of $CaOO_3$ = Cubic meters of CO_2.
    - 1.8647 $\times$ Kilograms of carbon = Cubic meters of CO_2 from coke.
    - 7.118 $\times$ Kilograms of carbon = Cubic meters of Nitrogen.
11. Cubic meters of CO_2 from calcium carbonate and from carbon plus cubic meters of nitrogen from the air = total volume of gas resulting from the lime kiln reactions, exclusive of excess air.
12. Oxygen is present in the air in the ratio of 21 parts to 79 parts of nitrogen by volume, that is roughly one part of oxygen to four of nitrogen, one of oxygen to five of air. The

presence of oxygen in the gas indicates the presence of a corresponding amount of nitrogen, over and above the amounts due to combustion of carbon. Then by multiplying the percentage of oxygen by 100/21 to be exact, or by 5 for approximate calculations, we may determine the relative volume of air which is mixed with the gases resulting from the reactions of the lime kiln.

13. From this the following ratios, useful in quick calculations, are derived:

One kilogram of $CaCO_3$ produces 0.56 kilogram of CaO.

One kilogram of CaO is produced from 1.785 kilograms of $CaCO_3$.

One kilogram of $CaCO_3$ produces 0.22377 cubic meter of CO_2.

One kilogram of CaO produced, results in 0.39953 cubic meter of CO_2.

One kilogram of carbon produces 1.8647 cubic meters of CO_2.

One kilogram of carbon burned in air produces 7.118 cubic meters of nitrogen.

One kilogram of carbon burned in air produces 8.9775 cubic meters of gas.

To demonstrate how these factors may be used in practical work, let us assume that we wish to use limestone of 96 per cent $CaCO_3$ and coke of 90 per cent carbon, and that 10 per cent by weight of coke on limestone has been found necessary by experiment to burn the limestone, what would be the analysis of the gas from the reactions, and what would be the volume of the gas from 100 kilograms of limestone?

$100 \times 0.96 \times 0.22377$ = 21.4819 Cubic meters of CO_2 from limestone
$100 \times 0.10 \times 0.90 \times 1.8647$ = 16.7823 Cubic meters of CO_2 from coke
$100 \times 0.10 \times 0.90 \times 7.118$ = 64.0152 Cubic meters of nitrogen from air used for combustion

Total Gas = 102.2794 Cubic meters
Subtract Nitrogen = 64.0152 Cubic meters

Difference = 38.2642 Cubic meters of CO_2
$38.2642/102.2794 \times 100 = 37.6\%$ CO_2 in total gas
$21.4819/102.2794 \times 100 = 21.0\%$ CO_2 from $CaCO_3$.
$37.4 - 21.0 = 16.4\%$ CO_2 from coke.

$16.4/37.4 \times 100 = 43.8$, the percentage of the CO_2 in the gas which came from the combustion of the carbon of the coke.

$100 - 43.8 = 56.2\%$, the percentage of the CO_2 in the gas which came from the decomposition of the limestone.

For this illustration we have taken a condition which is probably impossible to obtain in practice, as there is always excess air present in the gas as shown by the oxygen content.

The analysis by volume of the above gas would be:

Carbon dioxide	37.4
Carbon monoxide	none
Oxygen	none
Nitrogen (by difference)	62.6
Total	100.0%

Suppose we burn limestone under the conditions above given and find that the analysis of the gas actually is:

Carbon dioxide	35.6
Oxygen	1.0
Carbon monoxide	none
Nitrogen	63.4
Total	100.0%

What has taken place is that some air has become mixed with the gas produced by the decomposition of the limestone and the combustion of the carbon. This is shown by the presence of the 1.0 per cent of oxygen which indicates 5 per cent of air. In this mixture then we have 95 per cent of gas from the kiln reactions and 5 per cent of air. To determine the percentages of the original gas, we have only to divide the percentage of CO_2 found by analysis by 95×100, thus: $35.6/95 \times 100 = 37.4$, the difference between this figure and 100 is the percentage of nitrogen in the original gas.

If we should assume that we used only 8 per cent of coke or $0.90 \times 8 = 7.2$ per cent of carbon, we would find that the percentage of CO_2 in the gas would be higher than in the first example given where 10 per cent of coke was used, while, should we assume a third case in which 12.0 per cent of coke would be used, or 10.8 per cent of carbon on limestone, the percentage of CO_2 in the gas would be less than in the first example.

To make this clearer, suppose we should take a quantity of calcium carbonate and place it in a closed retort with an outlet to a gas holder, so that there would be no mixture of air with the gas evolved, and heat the retort to the dissociation temperature of calcium carbonate, the gas upon analysis would show 100 per cent CO_2.

In practice we have the limestone and the fuel mixed together so that the gases evolved are a mixture of the 100 per cent CO_2 from the calcium carbonate, and the dilute combustion gas from the coke which can never contain more than 21 per cent of CO_2, so that the greater the percentage of carbon on limestone in the coke, the greater will be the amount of nitrogen drawn in as a constituent of the air used for combustion, and the lower will be the percentage of CO_2 in the total gases, while the less the percentage of carbon, the higher will be the percentage of CO_2 in the gases.

As the purity of CO_2 from both the $CaCO_3$ and the carbon is always constant, and the only variable will be the proportion of carbon to limestone, it is quite easy to calculate a table or set of curves, from which the amount of gas may be produced for any proportion of coke to limestone. Fig. 1 has thus been calculated for this purpose, taking as a basis the amount of CO_2 which will be produced by the burning of 100 parts (or tons) of 100 per cent pure $CaCO_3$, with 10 per cent of pure carbon on the calcium carbonate. If the limestone used has less than 100 per cent $CaCO_3$, there will be proportionately less CO_2 from $CaCo_3$, and the amount of CO_2 from carbon will vary either way as the proportion of carbon to limestone varies, so that, if in any case we have given the percentage of $CaCO_3$ in the limestone, and the percentage of carbon (in coke) on the limestone, there can be determined by the use of the chart just what amount of CO_2 from any such combination would result, as a percentage of the amount of CO_2 which would be evolved from the 100 per cent $CaCO_3$ and the 10 per cent carbon.

The absolute amount of CO_2 from 100 tons of 100 per cent $CaCO_3$, burned with 10 per cent carbon on limestone, is 37,216.869 cubic meters at 0° C. and 760 millimeters pressure.

If the limestone contains 96 per cent $CaCO_3$, and 10 per cent coke containing 90 per cent carbon is used, by the use of the table we find the value 93.3, which, multiplied by 37,216.869 cubic meters, will give the volume of CO_2 from 100 tons of such limestone. If we wish to have the amount of CO_2 from any number of tons of such limestone burned with such carbon per cent, it is only necessary to multiply $37,216.869 \times 93.3$ by the number of tons of limestone, and divide by 100.

The total volume of gas may be derived from the weight of limestone and the gas analysis as follows: If the analysis of the gas shows 33 per cent CO_2, the volume of the total gas will be the volume of CO_2 thus found, multiplied by 100/33. This is useful in determining the size of gas pump required for any quantity of limestone under given conditions. In this case it is necessary to consider the temperature and pressure of the gas at the pump.

(To be continued)

Lime-Kiln Gases for Carbon-Dioxide Fertilization

EXPERIMENTS ARE REPORTED by a German, F. Riedel, indicating that successful results in promoting crop growth were obtained in hothouses through the use of carbon dioxide gas obtained from a lime-kiln. It was found that the yield was in some cases doubled and in others quadrupled, and these results are attributed to the use of the lime-kiln gas.

Similar experiments were carried out on field plots with a number of different crops including beets, potatoes, barley and lupines and resulted in every instance in large increases in favor of the soils treated with the carbon dioxide gas.

American-Made Whiting Replacing Imported Product*

Pulverized Limestone and Marble and Precipitated Calcium Carbonate Production Has Rapidly Increased Since 1916

ANOTHER PRODUCT whose output has increased through the results of the curtailment of imports is the pulverized limestone used as a substitute for English whiting and chalk. In 1916 the rough limestone reported as sold for the manufacture of whiting was 24,722 short tons, valued at $47,435; in 1917, it was 34,983 short tons, valued at $75,326; and in 1918, it was 43,011 short tons, valued at $196,944, an increase in 1918 of 23 per cent in quantity and of 161 per cent in value. This whiting was reported in 1918 from 10 States, Alabama, California, Connecticut, Florida, Illinois, Michigan, Missouri, Nebraska, Nevada, and Utah; in addition 28,815 short tons of pulverized marble ("marble flour"), valued at $86,619, was produced in 1918, a total of 71,826 short tons of whiting, valued at $283,563, sold during the year. In 1917 the total, including marble, was 58,276 tons, valued at $133,957, an increase in 1918 of 23 per cent in quantity and of 112 per cent in value.

The marble for this purpose was from Alabama, Georgia, Massachusetts, New York, and Tennessee. The greater part of this material was reported as sold for paint and putty filler, but it was also sold as a filler, for soap, rubber, pottery, and other products which contain whiting.

The average price of the total output was $3.95 a short ton. The individual prices received, however, ranged from $1 to $10 a short ton, evidently because of differences in care of preparation. Some of the specially-treated material sold as high as $20 a ton.

The quantities of whiting reported as used in different industries are not accurately known. According to information received by the Shipping Board, manufacturers of rubber goods consumed about 35 per cent of the total importation of chalk in 1917. Individual companies, however, reported that this consumption was as high as 75 per cent. Accepting 35 per cent as approximately correct, the Shipping Board estimated that about 50 per cent of the total imports was consumed by the paint industries, 10 per cent by the putty trade, and about 5 per cent for other uses, including glazes for ceramic goods, manufacture of leather goods, manufacture of chemicals, molds, and cores in brass foundries, filled for paper, mild abrasives especially for cleaning plate, adulterant in various processes, base for picture molding, and insulators.

When the shortage of ships was becoming increasingly serious during the early part of 1918, the Shipping Board considered curtailment of imports of chalk to half their normal volume, which, because of its bulk, consumed considerable time in loading and unloading. This plan brought protests from many importers and consumers who stated that English chalk or whiting could not be adequately replaced by domestic substitutes. The small curtailment made, however, brought no complaints of shortage nor any vigorous search for superior deposits of domestic chalk then or even later when the steamship companies themselves decided to stop carrying chalk so as to save time. Evidently a sufficient surplus was in the country to bridge over the brief interval of shortage, or domestic whiting made by the extremely fine pulverizing of limestone and marble was found adequate for use either alone or mixed with English whiting.

Consumers of imported whiting claimed that it was "amorphous"—a term which, to judge from microscopic examination, implied extremely fine crystalline particles accompanied by colloidal matter—whereas domestic whitings were "crystalline"—that is, of coarser grain and deficient in colloidal matter. Some domestic producers in 1918, however, claimed to be producing material of excellent physical properties, including pure white color, economical absorption of oil, good stretching power (in putty), and ability to take up more marble dust than English whiting. The increased use of domestic whiting tends to confirm these claims. Much of the domestic production in 1918 was consumed in the Central States, but some was shipped to New York and probably other Atlantic ports. One producer shipped from Death Valley to cities in California.

A few producers have been very secret about their raw material and process of manufacture, but others have been very willing to give any information requested. That made as a by-product from the pure-white marble of the Georgia Marble Co., at Tate, Ga., contains between 98 and 99 per cent of calcium carbonate, the remainder being chiefly lime-magnesia silicate. The finest grade produced passed 100 per cent through a screen of 300 meshes to the inch and was used in 1918 chiefly as a rubber filler. In contrast to this, whiting manufactured by the Metro-nite Co., Milwaukee, Wis., contains 44.62 per cent of calcium carbonate, 35.65 per cent of magnesium carbonate, 19.58 per cent of calcium-magnesium silicate, and 0.15 per cent of moisture. Its finest grade will pass 100 per cent through a 225-mesh screen. Domestic whiting manufactured by P. W. Nelson (Inc.), Brooklyn, N. Y., contains 98.50 per cent of calcium carbonate, 0.10 per cent of magnesium carbonate, 0.18 per cent of silica, 0.79 per cent of iron oxides, 0.02 per cent of alumina, and 0.07 per cent of organic matter.

The requirements of whiting for most uses depend on its physical properties, chiefly color, extreme fineness of grain, and the presence of considerable colloidal matter, but no exact specifications for any use except the ceramic industries have been reported to the Survey. According to P. H. Bates,* of the Bureau of Standards, Department of Commerce, whiting for the ceramic industries must be very low in iron oxides, preferably not more than 0.05 per cent; its content of calcium carbonate should be about 99 per cent, although it may be as low as 98 per cent if the impurities are only silica and alumina; it must be very fine grained so that practically 100 per cent will pass a 150-mesh sieve. The fineness of whiting must be such that it will not settle instantaneously in water, but that part of it, about 30 per cent, will remain suspended for some time. The chemical requirements will rule out most of the limestones and even some of the white marbles of this country, but some of the white marbles of Vermont, which have proved suitable for the manufacture of optical glass, and some from Georgia and Alabama, are quite satisfactory in chemical composition.

Mr. Bates also states that it is perfectly possible to prepare whiting from marble if the grinding is carried far enough and conducted with wet material. Perfectly satisfactory material has been produced in this way at the Bureau of Standards.

*Largely from the recent U. S. Geological Survey Report on "Stone in 1918," by G. F. Laughlin and A. T. Coons.

Cost and care to reduce the material to suitable fineness without introducing impurities, particularly iron oxide, are the determining features.

Chemically precipitated calcium carbonate has also been suggested as a substitute for English whiting. Considerable quantities of such calcium carbonate have been made as a by-product from the manufacture of basic magnesium carbonate, but, at least prior to the war, the cost of drying it and keeping it free from impurities has prevented its competition for the whiting market. It doubtless contains considerable colloidal matter; in fact, one manufacturer stated its absorption of oil, caused probably by the colloidal matter, was too high. A mixture of this chemically precipitated calcium carbonate with finely ground marble, however, should closely approximate English whiting in physical and chemical properties.

Some importers and consumers of whiting in their correspondence with the Shipping Board went so far as to state that there were no deposits of chalk in the United States and Canada. So far as the discovery of extensive high-grade deposits is concerned, this statement is essentially true. Extensive deposits occur, however, in the Cretaceous formations of the West-Central and Southern States and have been quarried by manufacturers of Portland cement, but they are of too low grade for the manufacture of whiting. The chalks of South Dakota, Nebraska, and Kansas contain from 88 to 95 per cent of calcium carbonate, the remainder being principally clay. Several analyses of chalks in southwestern Arkansas show calcium carbonate to range from 90 per cent downward. One analysis showing as much as 98 per cent of calcium carbonate has been reported, but there is no evidence that it represents the average of a workable deposit. The chalks of eastern Texas are essentially continuous with those of Arkansas and attempts to find deposits in them suitable for whiting are said to have failed. The Selma chalk which extends across Alabama and Mississippi is also generally of low grade.

Fresh-water deposits of finely divided calcium carbonate, called fresh-water marl, are also possible sources of suitable material, but they contain as a rule enough organic matter to darken their color. A few samples of unusually white material which may have come from such fresh-water deposits have been received by the Survey, and the suggestion has been made to the senders that it may prove suitable for whiting; but nothing further has been heard from them.

This country's participation in the war was hardly long enough to determine fully its resources of material suitable for whiting. The trend of the industry during 1917 and 1918, however, clearly demonstrated that, should imports be stopped, the country will depend far more on the careful preparation of ground marble and limestone than on the quarrying of chalk or fresh-water marl.

The imports of chalk are shown in the following table, compiled from figures furnished by the Bureau of Foreign and Domestic Commerce, Department of Commerce:

CHALK, ETC., IMPORTED FOR CONSUMPTION, 1916-1918

	1916		1917		1918	
	Quantity	Value	Quantity	Value	Quantity	Value
Chalk, crude, not precipitated, or otherwise manufactured, (duty free), long tons	133,188	$112,671	129,711	$126,605	83,933	$113,985
Ground or bolted (duty 0.1 cent a pound) pounds	.....	.....	1,195,955	6,241	241,752	5,829
Precipitated, for medicinal purposes (duty 25 per cent)	.....	27,713	.....	29,980	.....	34,273
Forms of cubes, blocks, sticks, dishes, or otherwise, including tailor's, billiards, etc. (duty 25 per cent)	.....	4,096	.....	6,563	.....	4,687
French, cut, powdered, washed, or pulverized (duty 15 per cent)	.....	628	.....	222	.....	266
Manufactured, not elsewhere specified (duty 25 per cent)	.....	249	.....	340	.....	617
Whiting and Paris white, dry (duty 0.1 cents a pound), pounds	2,308,726	9,952	4,054,622	22,485	2,446,180	16,949
Whiting and Paris white, ground in oil or putty (duty 15 per cent), pounds	28,334	972	37,230	2,879	14,282	1,904

The principal features of this table are the considerable decreases in the ground or bolted chalk, and of whiting and Paris white. The quantity of ground or bolted chalk decreased about 80 per cent in 1918, and the average price increased from about $10 a ton in 1917 to about $48 a ton in 1918. The whiting and Paris white decreased nearly 40 per cent in quantity and the average price increased from $11 a ton to nearly $14 for the dry material, and that ground in oil or putty decreased 60 per cent in quantity and the average price increased from about $155 a ton to $272 a ton in 1918.

Monthly returns from January to October, inclusive, 1918, showed that imports of crude or unmanufactured chalk were almost exclusively from England, a small quantity being credited to Denmark and a still smaller quantity being entered through Canada. Imports in February, March, April, and May have averaged about double those of the other six months. Nearly three-fifths of the total quantity was entered at New York; Philadelphia received less than one-third; and Massachusetts most of the remainder. A small quantity was entered at New Orleans.

Imports of "chalk, ground, precipitated, etc.," also came almost exclusively from England, a small amount being credited to France and trifling sums to Japan, Switzerland, and Canada. Of the imports received during the first six months more than two-thirds of the value was entered at New York; St. Louis, Philadelphia, and Maryland were next in importance; and Chicago, Indiana, San Francisco, Porto Rico, Massachusetts, Hawaii, and Maine-New Hampshire received small amounts.

† Written communication May 7, 1918.

Mica from South America

THE IMPORTS of mica from South America prior to the war was practically negligible, relatively and as an item of trade exchange, but the war stimulus directed attention to the possibilities of securing regularly a part of the large imports of this special raw material from this new source of supply.

The principal countries which are now known to have available deposits of mica of desirable quality and size for import, are Brazil and Argentina. In Brazil the deposits mainly located in the contiguous states of Bahia, Goyaz, Minas, Garaes, and Sao Paul are extensive and are now fairly accessible to railroads for transport to the ports. The quality is good and compares well with the Indian mica. Some of the large plates are 20 in. by 10 in., and large supplies 6 in. by 6 in. are procurable. In the interior province of Goyaz mica is so plentiful that the natives have long used it for windows.

The output of the Brazilian mines is steadily increasing. The proportion coming to the United States has always been large and is becoming greater. There is a prospect of a steady and increasing supply of good mica from Brazil if the American buyers will take the trouble to encourage the relation and to seek out the producers who are not well advised as to market requirements nor as to the best methods of recovery and preparation of their crude material.

The Argentine mica deposits are mostly in the mountain provinces of Cordoba and San Luis. They are not systematically developed and the shipments so far made have not been of so good a quality as those from Brazil.

Small shipments of mica from Peru were made during the war and irregular shipments have come from Guatamela for a number of years. The latter mica has a green shade and is not so desired for some purposes as other grades in the market.

South American mica must compete with Canadian and Indian products in the United States market. The present domestic production and prospective supplies of mica are quite inadequate to meet the demands either in quantity or in special grades.

Industrial Situation Calls Most for Confidence and Production*

Causes of Present Stagnation—Extraordinary Measures Taken to Fill Cement Orders—Bright Future for Construction Industry

By B. F. Affleck
President, Universal Portland Cement Co., Chicago, Ill.

TO ACCOUNT for the present inactivity in the construction industry it is necessary only to recount briefly some of the occurrences that have affected the industry in the last year or two.

Before the signing of the armistice the construction industry was hampered by war restrictions. After the armistice these war restrictions were removed but many of those interested in construction work hesitated to go ahead until conditions generally had settled on a reasonably firm basis. The result of both these factors was a large accumulation of work waiting to be done, the most important items perhaps, being dwelling places and highways.

In mid-summer of last year activity was resumed and the demand for labor and building materials reached its height in the early months of 1920. By July 1 the demand for labor and materials for new projects had begun to recede because of obstacles in the way of prosecuting the work. These included high money rates, restricted credits, high prices for labor and materials, difficulty in securing materials because of curtailed production and, perhaps most serious of all, inadequate transportation.

In addition to the other difficulties retarding building, a disposition apparently growing out of war restrictions has continued to curtail through credit and the use of railroad cars that part of the Nation's construction program that might otherwise have been carried out. The New York Times on Sunday, September 26, 1920, in an article signed by Allen E. Beals referred to "the notorious No. 7 Service Order, which when the companies protested against its enforcement so rigidly as to exclude all limestone from cement plants, even to the point of forcing mill shutdowns recently, was answered by the assertion that if further complaints were heard it would be applied so as to make it even more rigorous." The article states further, "Had this order not been promulgated there would have been produced some 7,000,000 more barrels of cement at the then mill operating rate of 70 per cent of capacity and much of the present stress for cement supply would have been avoided and building would have been much further along."

The order referred to is Interstate Commerce Commission Service Order No. 7, which successively under Orders No. 9, 15 and 20 has been extended indefinitely, and restricts open top cars with sides of less than 38 in. in height largely to the movement of coal, causing curtail-

B. F. Affleck

ment of the movement of building materials and other materials used in the manufacture of building materials.

As a result of the obstacles named, and others, there is still a large accumulation of construction work waiting to be done, and reports from architects' offices and other sources are that a great deal of work is being held at the point of preparedness ready to go ahead with the disappearance or alleviation of some of the retarding influences.

Outlook Is Brightening

Happily improvement is already noticeable in some directions. The railroad situation which has been probably the most troublesome factor in the situation is much better than some weeks ago. Labor is available and equally important, it is increasing in efficiency, although wages are still high. These two circumstances alone will go far toward improving other factors. Better railroad operation will make possible the movement of farm products and other materials, thus releasing money now tied up, and at the same time will increase production which is the fundamental requirement of prosperity.

Such difficulties as the car shortage and the switchmen's strike, as well as others mentioned, offset not only outgoing shipments from manufacturing plants, but also production at these plants by interrupting the supply of coal and raw materials and by curtailing the switching of cars in yards necessary to the operation of the plants, and curtailed production, of course, means higher cost of production with resultant higher prices.

Using cement as an example, the difficulty in this year of unusually heavy demand has been not lack of manufacturing capacity but inability on the part of the manufacturers to keep their plants operating at capacity. The curtailment in cement production was caused by strikes and scarcity of labor at cement plants, strikes in other lines of industry, on which the cement plants are dependent, such as strikes in the gypsum plants, the strike of coal miners last Fall, the strike in the Illinois-Indiana coal fields in July, the strike of railroad switchmen which extended through the greater part of this year, and the general lack of transportation facilities, including embargoes on the railroads. The ratio of cement production to manufacturing capacity for the entire year 1919 was only about 54 per cent, and for the first nine months of 1920 about 67 per cent. The rated capacity of all cement mills in the United States is about 125 million barrels annually. The most cement ever used in the country in a year was about 94 million barrels in 1916. That is to say the country has never used as much as 75 per cent of its productive capacity, conservatively estimated.

How the Universal Met Difficulties

In the case of the cement company

*Statement made to U. S. Senate Committee on Reconstruction and Production, Chicago, November 11, 1920.

operated under my direction, our difficulties date back to August 1, last year, since which time strikes have interferred seriously with our mill operations. As a result, some jobs for which we could have supplied cement and which might have been completed last Fall, carried over into this year. The year opened with an extraordinarily heavy demand so that by February 1 our mills were about 2,300 cars behind on shipments, and about March 1 this figure had grown to 3,600 cars. The peak came in the first week in May when we were about 6,100 cars behind, the oldest order dating from January.

The direct cause of these delays was the acute car shortage which was continuous over the first half of the year. There were times early in the year when our cement bins were taxed to capacity making it necessary to adopt unusual means of delivery to make room for continuous operation of our mills. One of these means was the use of restricted railroad cars, privately owned cars furnished by customers and by ourselves, stock cars, open top cars which involved the use of tarpaulins to protect the contents, and bad order box cars. Cement, of course, under ideal conditions is shipped in box cars in good order but this year we have had to take what we could get regardless of expense and inconvenience. Use of restricted and privately owned cars, for instance, to some extent took the distribution of our product out of our own hands. We were offered at our Buffington, Ind., plant, one day by a certain railroad, a number of cars restricted to movement to Minneapolis and St. Paul. Aside from the fact that freight rates to the Twin Cities are much higher from our Buffington mill than from our Duluth mill, we did not want at the time these cars were offered us to move so much cement at one time into the Twin Cities, preferring rather to distribute it among a number of customers elsewhere whose needs were most urgent. Many times through the season we have received bunches of these restricted cars and have used them only because we did not have enough unrestricted cars to distribute our product equitably and to keep our loading and packing forces occupied and our mills going.

Extensive Use of Motor Trucks

Another means adopted to keep our product moving was the use of motor trucks, involving, of course, additional expense to ourselves and our customers. From all our plants about two and a quarter million barrels of cement were moved by truck for the nine months ending September 30. The movement from our Chicago plant at Buffington, Ind., was just under two million barrels of which about a quarter of a million barrels moved to team tracks of trunk lines that do not enter our mills, and more than a quarter of a million barrels to a dock where the cement was loaded onto boats for transportation to lake ports. The extreme to which our Chicago plant went in truck deliveries is shown by the fact that as many as 613 trucks were loaded in a single day, the equivalent of about 120 cars. This was at the rate of more than a truck per minute.

Our truck deliveries to customers in the Chicago district have been about a million and a half barrels, the equivalent of 7,500 carloads of 200 barrels each. This means that the cement requirements of Chicago this year have been more satisfactorily supplied than perhaps any other city in the country, and that about 7,500 railroad cars in a time of acute car shortage would have been required to accomplish the work done by trucks. It would seem unnecessary to advance any other fact than this as an argument for the construction of well paved highways and city streets. Truck traffic must be available to supplement railroad service, and trucks must have permanent roads to run on. The Chicago district has been fortunate in its cement supply and is assured of its supply next year to the extent that manufacturing conditions will permit. It can use trucks instead of cars if necessary, but this fact cannot overcome the effect of occurrences like the coal strike in the Illlinois-Indiana fields last July which cost about 200,000 barrels of production at our Chicago plant.

Other Limiting Factors

It should be borne in mind that if all cement users in Chicago and elsewhere had been able this year to secure all the cement ordered by them it is very probable that they would have found themselves in the position of being unable to use all the cement so ordered. This means that so many factors were present to delay work, that the disappearance of one of these factors such as failure to get cement would not have eliminated the other factors. In other words, if a particular job had been able to secure all the cement needed it would not have been able to secure sufficient sand and gravel or stone; if these materials had been forthcoming there would have been a scarcity of or trouble with labor, and if labor had been available and efficient, there would have been difficulty in securing credit to allow the work to proceed.

Building Bound to Boom

The outstanding fact in the whole situation is that need for structures of many kinds is present throughout the country and must be filled sooner or later. The way for building activity will clear as soon as all or at least some of the obstacles mentioned begin to disappear. In other words, the crying need in the construction industry is production in its broadest sense, not only of building materials but of everything necessary to keep the industry going—transportation, labor, fuel, credits, confidence, and the last perhaps is greatest of all since the others will follow it. Confidence and production are needed, and lack of them simply adds in a greater or less degree to the high cost of living, and forms a part of the "vicious circle" that has been with us through these war and post-war times.

A further consideration and a most important one is that all effort whether it be in the form of money, credits, materials, labor, transportation or what not, that goes into construction work, unlike that going into work of many other kinds, is not consumed. At a time like this when owners, contractors and others may be discouraged from undertaking new projects, this thought should be given prominence. Effort that is being expended throughout the country on many things that are consumed might well go into construction work, where the materials and labor and other things involved are not consumed but transformed into houses, industrial buildings, improved highways, water power development and other valuable improvements that form additions to the permanent taxable wealth of the country as well as tools for production of additional wealth.

English Cement Manufacturer May Enter Texas Market

AUSTIN TEX.—The Ship Canal Portland Cement Manufacturers, Ltd., of Ellesmere Port, England, is considering the matter of entering the Texas market with its product, according to a letter just received by G. A. Parkinson, assistant testing engineer, Bureau of Economic Geology of the University of Texas. The Bureau has also received a sample of cement from the British company to be tested in order that it may learn whether it comes up to the requirements for such material in this State. The letter to Mr. Parkinson reads:

"We have been receiving recently some very considerable enquiries in connection with shipment of our "England" Brand Portland Cement to your market.

"We understand that there is a very big shortage of Portland cement ruling in Texas, and to enable us to deal more fully with the inquiries which we at present have, we are sending you under separate cover a sample tin of our Portland Cement, as, we understand it is necessary for your Bureau to determine whether such shipments are up to the required standard.

"No doubt you will be good enough to acquaint us with the result of your test on the sample we are sending you as early as possible."

Condition of the Mid-West Sand and Gravel Industry

Analysis of the Present Situation and Recommendations for Relief—Ben Stone's Statement Before the Senate Committee on Reconstruction and Production

BEN STONE, secretary of the Illinois Sand and Gravel Producers' Association, at the hearing of the U. S. Senate Committee on Reconstruction and Production at Chicago, November 11, presented an excellent analysis of the situation brought about in this industry by the shortage in transportation in the central west states. While his statement referred specifically to Illinois conditions, these are of course typical of conditions throughout the territory east of the Mississippi River and west of the Atlantic seaboard states. Mr. Stone said, in part:

"To begin we might refer briefly to the situation which existed in the early part of 1919, when the whole country seemed to be of a mind that immediate attention should be given to catching up with construction which was so seriously curtailed during the war. It will be remembered that a good deal of time was consumed in the preparation of plans and estimates for various projects and that actual construction was very late getting started. I recall that none of the sand and gravel plants in Illinois and surrounding territory had anything like a satisfactory turn before the first of July.

"During the balance of the year there were a great many interruptions to building from one cause or another and the closing months found a large volume of work unfinished, leaving many of the plants with sizeable contracts for material held over.

"During the ensuing winter quite a number of our people made comparatively large investments improving and enlarging plant facilities and several new plants were built, with the idea of meeting the enormous demand which then appeared to be in prospect and which it was confidently believed would become active early in 1920.

"Personally I have felt that finance and transportation are the main factors—labor having contributed to each—but I suspect the average producer if asked what has most affected his business would say transportation.

"Some time before the beginning of the operating season this year it became apparent to all closely in touch with the general situation that under the most favorable circumstances there would be a great shortage of rail transportation for building material.

"On May 25 Service Order No. 3, issued by the Interstate Commerce Commission, and directing the movement of a vast number of open cars from the West to the East, became effective. This was followed very shortly by Service Order No. 7 giving priority to the movement of coal, and from that time until now so far as sand and gravel producers have been concerned it has been just one thing after another.

"The situation on the Chicago Terminal has been such that it was extremely difficult to get material into that market prior to September 19. The plants on one road were restricted for a long time to a maximum of five cars per day, but very seldom got that many and often received none for days at a stretch. On another road several plants were furnished no cars from May 25 until late in July.

"Members of our Association operate 67 plants. Generally speaking they produce only what can be loaded on cars. Up to the first of October the total production of all plants was approximately 15% of capacity and only about 25% of all sand and gravel produced in the state in 1916 as reported by the Geological Survey.

"We have evidence on every hand today that the transportation situation is much better than it was a few months ago and is steadily improving. We have every reason to believe and expect that it will continue to improve within reasonable limitations. It is anticipated that additional facilities will be procured as rapidly as money can be obtained and time will permit.

Necessary Reforms

"I should like, however, to direct your attention to certain features of the new Transportation Act which I believe might well receive careful consideration by this committee.

"The law itself is probably the greatest legislative experiment we have ever had. It has been called a compromise measure and I have no doubt that is true. The committee in the House and Senate having to do with its formation certainly had enough advice from the outside to make it most any kind of a measure. Nevertheless, being reminded that the formative period extended over some eight or ten months of active work, I think we must agree that it represents the best thought, at the time of its passage, of all concerned.

"It has in it some provisions which I think are fundamentally wrong and which I think crept into it as a result of the state of mind which obtained throughout the country after the war and which has just recently begun to correct itself. I think paragraphs 12 and 15 of Section 402 which have to do with rules, regulations and practice pertaining to car service are such provisions.

"It was during the war that we began to think in terms of emergency and it was during the war that we accustomed ourselves to priorities and permits in transportation.

"Such matters have no rightful place in our peace-time transactions. They are not in harmony with that provision of the law which requires the carriers to furnish adequate transportation nor are they in harmony with that part of the law which guarantees all shippers against discrimination.

"I would respectfully recommend that this committee give consideration to the advisability of having Paragraphs 12 and 15 of Section 402 of the Transportation Act of 1920 either stricken out or amended in such a way that rules, regulations and practices legally published to govern car service may not be set aside in times of peace until full hearing has been granted *all* interested parties.

"As to the administration of the law by the Interstate Commerce Commission up to the present time, I have no criticism to offer.

"While I have not agreed with everything that has been done in the matter of car service, I have felt that the Commission has at no time lacked sincerity of of purpose and that the service orders issued have represented the best judgment of the members as to what was required for the proper protection of the public welfare.

"I regret, however, that I cannot say so much for the manner in which these orders have been applied by the carriers.

"The American Railway Association has created a Washington bureau, first known as the Commission on Car Serv-

ice and later as the Car Service Division. The officials of this bureau have undertaken to interpret the Interstate Commerce Commission's orders for all of the roads individually and collectively. They have made arbitrary rulings and demands for continuous movement of empty cars from one road to another, thus heavily increasing operating costs, and have denied the right of an individual road to apply the Commission's orders in a manner that would best conform to conditions on that road.

"In my opinion this plan as it has been operated so far has violated fundamental principles that are vital to the public welfare, and while I am not prepared to say that the Car Service Division is not needed as a point of contact between the Commission and the carriers, I believe the absolute control of car distribution which has been exercised by this bureau up to now must be discontinued before we can approach a more satisfactory condition as regards car service.

"A most forceful example of this has just come to my attention today. On November 6 the Interstate Commerce Commission amended Service Order No. 20 so as to remove from the coal car classification all open cars under 42 in. in height, inside measurement, and which it was estimated would increase the number of cars available for other than coal loading by 25,000. But, regardless of the fact that the Commission's order as it relates to loading of coal cars in direction of the mines has not been changed, the Car Service Division has served mandatory instructions on roads in this region that no cars with sides over 42 in. in height may be loaded in any direction except with coal.

"I trust I may be pardoned if I say in closing that I think it is to be regretted that the Congress did not find some way during the special session of 1919 of dealing with this important question and I believe many others share this sentiment. Nevertheless there are many more, I know, who will join me in expressing the hope that the labors of this committee will crystallize during the early days of the coming session of the new Congress into positive and constructive action."

Demand for Belgian Cement

BELGIAN cement manufacturers are continuously in receipt of inquiries from the United States, England, and other countries for supplies of Belgian Portland cement. The manufacturers are unable, however, to fill any orders, because the present output of about 50,000 tons a month, which is only half the normal production, is consumed by Belgium and Northern France in reconstruction work. In fact, the consumption is greater than the supply and Belgium is itself an importer of cement at present.

Outlay for Rural Roads and Bridges Increases

DURING THE CALENDAR YEAR 1919, 46 States of the Union expended over $400,000,000 on their rural roads and bridges, the Bureau of Public Roads of the United States Department of Agriculture recently announced. This total is made up of the actual cash expenditures for such items as labor, materials, supervision, and administration, amounting to $389,455,931, and convict labor and statute labor, the value of which, not definitely known, is estimated at about $132,000,000. So far as possible, all expenditures on city streets within incorporated towns and cities and all items of sinking-fund payments or the redemption and interest payments on road and bridge bonds have been excluded.

The road and bridge expenditures for 1919 show an increase of approximately 33 1/3 per cent over those of 1918 and 70 per cent over those of 1914. More striking, however, is the increase in the proportion of the total funds supervised by the several State highway departments. In 1918 the expenditures by or under the supervision of the State highway departments amounted to $117,285,268, while the local road funds, over which they exercised no control whatever, amounted to $168,812,925. In 1919, however, the State highway departments supervised the expenditure of $200,292,694 as against the total of $189,163,237 expended by the local road and bridge authorities.

State of Wisconsin Buys Out Quartzite Plant

AFTER 15 YEARS of negotiations the State of Wisconsin has come to terms with the American Refractories Co. at Devils Lake, Wis., over the removal of its quarry operations beyond the limits of what is now a state park.

Under the agreement, the company is to remove its operations on or before January 1, 1922. It will conduct its quarrying thereafter in the easternmost part of the quartzite ledge on what has been known as the Golman property. This property is about 1¾ miles east of the south shore of Devils Lake and completely outside of the park limits.

The state paid the company $75,000 for its 65 acres property at Devils Lake. All buildings and improvements go to the state. In addition to the cash payment, 57 acres outside the park limits is conveyed to the company.

The concern will effect its own removal and construct its own spur to the new site. This will cost over $100,000. The company also has acquired about 300 acres of land in the vicinity of the new quarry at a cost of more than $30,000.

Maryland Macadam Roads Get High Praise

IT IS BETTER to build a cheap road and keep it in good condition by adequate maintenance than to build the most expensive highway and permit it to deteriorate for want of care, say officials of the Bureau of Public Roads of the United States Department of Agriculture.

Maryland, which has one of the finest systems of improved highways in the United States, if not the best, has consistently followed this practice. The originally improved roads in Maryland were comparatively inexpensive, costing only what the taxpayers were willing to pay for. The first few years the average cost was less than $10,000 a mile. In some cases the work entailed considerable grading and drainage, but in others it amounted simply to resurfacing the old turnpikes, which had already been graded and drained.

Generally the roads built at that time were macadam, 12 ft. wide and 6 in. thick. Soon the width was increased to 14 ft. Later many were widened still farther, some very successfully, by adding concrete shoulders on each side of the existing macadam. This method of improving roads makes it possible for traffic to continue unimpeded on the road while the work is going on.

The macadam roads in Maryland have given very good satisfaction, but continuous care has been largely responsible for their success. The roads are constantly patrolled and no hole of any size is allowed to go unrepaired. Material for patching is kept at convenient points along the road for the use of the patrolman. From a relatively small investment in admittedly low-type road it builds up a better one from year to year, always conserving the bulk of the previous investment.—News Bulletin of the U. S. Department of Agriculture.

Texas May Use Brazilian Rock for Highways

AS A RESULT of the shortage of cement in Texas, construction of highways with rock brought from South America is more than a possibility, according to press dispatches. As an evidence of this fact there is being tested a shipment of rock that was recently unloaded at Orange from a steamer that took the rock as ballast from a port in Brazil. It is said that if this rock should be found suitable for road building, it will be used for road building. It may be obtained at nominal cost as it is brought as ballast.

It will be remembered that rock is not found near the Texas coast and that oyster shells have hitherto been the principal material used for macadam roads.

Editorial Comment

Government Ownership

Reference was made in a brief editorial note in ROCK PRODUCTS, November 6, page 53, to the assistance newspaper editors could be relied upon to give legitimate producers in combatting government ownership or operation of sand, gravel, crushed stone, cement or other kind of plant in the rock products industry, if the matter were placed before them in the right light. The figures given in the editorial note in question were in error.

They did not present the case anywhere near as strong as it is, for the numbers given were for one state only. Below is an analysis of the returns for the entire country.

Government operation of industries is more unpopular than it was a year ago in the opinion of the country's newspaper editors. A questionnaire sent out by the Press Service Co. of New York City asking the editors to state the sentiment of their communities brought 5,154 replies. Of these, 4,466, or 86 per cent, declared that their readers were opposed to the Government entering into business competition with its citizens. A questionnaire sent out to the editors by this same company a year ago in connection with the proposed continuance of Government operation of railroads brought adverse replies from 83 per cent of the communities represented.

Leaders of both political parties who have studied the report of the questionnaire find it interesting evidence that Goverment ownership is not in politics. There is a remarkable lack of political bias in the replies. The papers represented are 1,857 Republican, 1,350 Democratic, 1,485 Independent, and 462 miscellaneous, including labor organs, etc.

From Democratic Texas, for example, the present questionnaire brought replies from editors of 244 papers, only three of which are Republican. Yet the percentage against Government operation was 92, which is exactly the same that is given by 200 editors from Republican Michigan, among whom were representatives of only three Democratic papers. Other States that pair percentages significantly are Massachusetts and Nevada with 100; Connecticut and South Carolina with 97; Maine and West Virginia with 96; Kentucky and New York with 91; Missouri and Pennsylvania with 89; Ohio and Oklahoma with 87.

In the southern section as a whole, where replies came from 65 Republican papers and 389 Democratic, the percentage against Government operation was 88, while in the Great Lakes section, with conditions reversed, 478 Republican and 155 Democratic, the opposition was 87 per cent.

Replies from the West, Middle West and Southwest show that it is a mistake to consider those sections more favorable to radical Government experiments than the East. The radicals can get little comfort out of the 89 per cent of thumbs down—3 per cent above the average—in the Southwest, including Arkansas, Louisiana, Missouri, Kansas, Oklahoma and Texas. The 82 per cent opposition of the Northwest, including Iowa, Minnesota, Montana, Nebraska, North Dakota, South Dakota and Wyoming and the 83 per cent veto of the Far West group, including Arizona, California, Idaho, Nevada, New Mexico, Oregon, Colorado, Utah and Washington, are significant of the prevailing conservative sentiment on this question even in the more radical sections.

The combined circulation of the papers whose editors replied is 11,428,817, which means, according to the usual estimated ratio between circulation and readers, a constituency of at least 44,000,000. And this constituency is pretty evenly scattered throughout the country, no considerable section of any State being unrepresented. The estimate of opinion based on this thoroughly diffused 44 per cent of the country's population may, therefore, it is claimed, be considered a fair representation of the people as a whole.

"Battling Johnston"

Much progress has been made recently in gaining new members and prestige for the National Association of Sand and Gravel Producers. Both President V. O. Johnston and Business Manager E. Guy Sutton have worked unremittingly for several months past in the Southwest, building up local associations and adding new members to the national roll.

The result is that the National Association now has a $30,000 fund to work with and to carry out its plan to bring matters to an issue with the Interstate Commerce Commission as to whether or not the industry is entitled to a fair share of railway transportation. The office of the association has been moved to Washington, D. C., and tangible results may be looked for soon.

The day will come, without a doubt, when every single producer of sand and gravel will look back on the fight President Johnston and his associates have made for the industry as the turning point in its history. His steadfast purpose to gain recognition of the sand and gravel industry, whatever else it may accomplish, has cemented the producers of the industry into a real fraternity and developed an organization that is capable of accomplishing much good for the whole construction industry. In Texas even the crushed-stone men insist on joining his fighting "Prairie Division."

Stick-to-Itiveness

The Faculty That Counts, No Matter What You Are Trying to Sell or Put Across

By Frank Farrington

STICK-TO-ITIVENESS is an awkward name to give to a clear cut, concise quality, but it seems to fit it and to describe it better than any shorter and less ugly term.

When I refer to stick-to-itiveness I do not mean attaching yourself to a prospect and clinging to him like a leech until he signs an order so as to get rid of you. There is such a thing as sticking too tightly and annoying a buyer so he will never want to see you again. He may buy to get rid of you but next time he will see to it that you do not get a chance to stick. He will set you down as one of those insistent, persistent, book-agent types of salesmen who will use all the time they can get and never know when they are unwelcome.

Stick-to-itiveness means sticking to the job of interesting your trade and trying to get your share of the business in your territory more than it means sticking to the individual buyer. It means keeping right at your work until you have accomplished what you set out to do. It means interesting the man you want to interest. It means getting a chance to introduce your line with him, even if you have to call a score of times and put up with a score of rebuffs before he finally comes through.

There is no credit attached to selling a buyer what he has already made up his mind he wants to buy, and it requires no staying quality to get an order from that man. But it is different when you call on a man who says, "I've tried out something like that of yours and it made us all kinds of trouble. Absolutely nothing doing!"

Unless you have some sticking qualities, you will not get any business out of such a buyer either then or later. You must have the courage to take his condemnation with good grace and you must have the courage to go right ahead and explain the difference between what he has tried without success and your own line which you know will give him different results.

Salesmanship is not a profitable occupation for a man who is easily discouraged. The man who cannot stick when he is out to sell himself will not be apt to be much of a sticker when he is out to sell stuff in which he is no doubt less interested than in himself, and about which he is less well informed.

There is more to stick-to-itiveness as a success making quality in a salesman than the mere ability and determination to hang to a man until he buys or gives some good reason for refusing to buy. Just plain sticking may make some sales, but it may make them as the expense of friendliness. You may sell to a man and congratulate yourself that your persistence won out, when, as a matter of fact, you simply wearied the buyer whose will for the time gave way to your pounding and he bought. Next time he will remember the experience to your disadvantage.

We all like to think we are buying of our own volition whether we are or not. Any signs of an attempt to crowd us along develop our resentment at once. We don't want to be over-urged.

Stick-to-itiveness is a quality that is developed as a result of character, and also it is a quality that develops character. If a man has the sticking quality, it is going to help him to develop all along the line. When such a salesman gets the idea that he wants to learn how to do better work, when he makes up his mind that he will study the business and become more familiar with it, he sticks to the new determination and he sticks to the studying until he has accomplished something.

The man who sticks in selling, sticks in other things. The quality is not one that we apply to part of our daily occupation and omit from the rest. It is a quality that is essential in any part of our work, because the things that are to be done easily and without much effort and only a few of the unimportant parts of our day's work.

There is more satisfaction, too, for the man who has the sticking quality. If he has the ability to stick to something until he puts it over, he gets more pleasure out of his success, because it has become a success more worth while than it would have been if it had been quick and easy. We don't pat ourselves on the back for getting an order that was thrown at our heads when we went in to see the buyer.

One reason for encouragement in sticking, in continuing to call on a buyer time after time in spite of the fact that he always turns you down, is that you never know what that man has in his mind. You never know just how near he may be to buying from you. He may refuse you a dozen times and the twelfth time his refusal may sound just as final and complete as it did the first time, and yet the thirteenth time he may order.

And you never know what may happen in an unexpected way to cause a buyer to become dissatisfied with his regular source of supplies. Something may go wrong with his usual lines. Another house may go out of business or run out of material, or their salesman may be holding that man's trade by reason of personal friendship, and the salesman may leave that territory or go into other business.

If you have stuck right to that buyer, never failing to see him and to give him a chance every trip to buy from you, then you are in a position to pick his business right up when somebody else drops it.

The man who sticks to it is Johnny-on-the-spot when his opportunity comes, while the man who is a quitter misses all the things that might finally come his way. It is worth while to develop the quality of sticking to it, if for no other reason than because nobody takes to a quitter. All the world quits a quitter and his best customers will incline that way.

The man who has the habit of sticking to what he is at will be a good enough salesman so that no one will want to shelve him as long as he produces satisfactory results, and such a man is going to show sticking quality when it comes to the matter of dropping out because he is advanced in years. There will be no evidence of a willingness to retire before reaching the time when retirement is desirable. He will be influenced by his natural habits and stick to the last.

He might have been going strong yet in the same way but he became a little discouraged over some phase of his business affairs and he let down temporarily and allowed his shoulders to droop and discouragement to get the better of his judgment. He gave up his exercises because it seemed too much trouble just then, and nothing appeared to be very much worth while.

There comes a time in every man's experience when he feels an inclination to give up. He feels old for a day, perhaps, and he makes no effort to overcome that feeling. So it gets the better of him. The next day it takes more courage to come back and he lets go again. Well, you know how it is, I am sure, because you have had those days when you had to call upon your stick-to-itiveness to get you back up the hill.

Building Activity in the East Suffers Temporary Slump

Price Reductions of Some Materials Looked on as Temporary Only —No Surplus or Reserve Stocks

BUILDING MATERIAL MANUFACTURERS are at present catering to buyers' market conditions, says the Dow Service Building Reports. This is noticeable in the current prices on brick, lumber and metals, but signs developed quite recently indicate that the bottom is being reached on price concession in such items as structural steel and similar finished products, oak, maple, poplar, cypress, North Carolina pine and common brick.

Caution is beginning to mark the movement of building material prices and new building projects. Recent price cuts have been found to be ineffectual in bringing out new building work. Therefore there is a well defined disposition in some lines to cease price cutting.

Brick, for example, which receded from $25 a thousand, wholesale, to $15, has become a drug on the market at the low price. That which is still available at that price still lay untaken at the close of the second month last Friday. Better grades have been going out at as high as $18 without interruption. Therefore the scarcity of $15 brick at the week-end and the preponderance of brick that was moving out readily at higher levels caused the market quotation to move up to a $16 to $18 wholesale price range as the week drew to a close.

Manufacturers of building materials closely watched the effect of lowering prices on building materials during the last two months. They viewed the possible outcome with doubt. The price shrinkage came at the end of the building season. It also came, they noted, simultaneously with an improvement of railroad transportation facilities. It was also remarked that it was heralded at a time when immigration was beginning to become noticeable in industry. It was coincident with the general discharge of great numbers of factory and mill employees and closing of building material manufacturing plants, notably brick kilns and lumber plants for one reason or another.

Capping all of those influences tending to focus attention upon the effect of building material price reduction to the consumer was the election campaign which unsettled building construction plans, the acts of the special session of the New York State Legislature concerning the rights of building owners and the subsequent announcement of the official state investigation of the building construction industry in this market.

Those who are actuated by a disposition to wait and see the effects of the inquiry, either in the form of new building laws, or the creation of a state board or commission to pass upon building projects of all kinds and constituting an official New York state board of arbitration and appeal in all labor disputes, for the registration and supervision of all building contracts for supplies of building materials as well as agreements between employee and employer and between owner and architect, financier and broker do not believe that such laws can be drafted and enacted before the 1921 building season formally gets under way.

The period of so-called free-construction, therefore, is limited ere corrective legislation is applied to the conditions that have been revealed in the building industry of this city.

It is conservative to assume that once the prospective building horizon is cleared the building construction public, or that part of it that can finance its own way without depending upon the aid of the recognized lending institutions, will rush into the market with new projects. By that time there will be more yokeless workmen, building material manufacturers will have had an opportunity to catch up with the back-log orders and non-deliveries and the cost of production as well as handling of materials will have been drawn nearer to a normal basis.

It must be remembered, however, that there is nowhere in the building industry large surplus of building material supplies. Outside of the lumber dealers, distributors in this market have no reserve stocks.

Couple this condition of building material supply with a prospective stampede to anticipate the more or less experimental application of new laws as applied to construction in all its details, and at the same time bearing in mind the application of recent attempts to legislate for or against building construction and it at once becomes apparent that building material prices have not yet come down to stay.

COMPETENT AUTHORITIES in various departments of building material manufacture have declared that nothing like the $1,200,000,000 of new construction work, which statistics show has been undertaken this year, has been completed. Much of it represents material still to be delivered. Furthermore, available stocks on hand or likely to be produced between now and the first of the building season of 1921 will allow little or any margin for late comers into the building market.

Cement offers as good a barometer as any commodity because it enters into probably the greatest variety of structures, including railroad work, which will be still another factor of drain upon material supply.

In the cement manufacturing districts supplying the New York market the present rate of shipment and estimating November and December shipments mills in Zones 1 and 2 will have shipped in 1920 over 31,000,000 barrels. With good transportation facilities, such as manufacturers are now experiencing and absence of arbitrary orders from the Interstate Commerce Commission and better labor conditions, the same Eastern mills should be able, in the absence of the evils above referred to, to ship in 1921 several million barrels more than in 1920; manufacturers go into the new year with less contract obligations for delivery of cement through 1921, whereas in 1920 they had heavy obligations for future shipments.

No Stocks of Cement

However, the cement made during the month of October, 1920, in Zones 1 and 2 exceeded by 6 per cent that of October, 1919, and amounted to 3,200,000 barrels. The shipments were nearly three and a half million barrels, but because of lack of cars amounted to only 97 per cent of what they were a year ago. October production was the greatest ever recorded.

The cement on hand was dwindled as of November 1, 1920, to almost negligible proportions, the total being 750,000 barrels, or only 33 per cent of what was on hand in October, 1919. Leaving outside of the calculation the two largest companies in the industry, those two companies having only 175,000 barrels each on hand, the average for eight manufacturers was only 22,500 barrels in the warehouse which does not represent very much more than the dust on the beams. Stockhouses are thus practically empty. Never has such a condition obtained before.

South Dakota to Operate Cement Plant

THE State of South Dakota is the next State in line to contemplate the establishment and operation of a portland cement plant of huge capacity.

For this development the sum of $1,000,000 already has been appropriated, together with an additional $25,000 for prospecting expenses, and another appropriation of $500,000 is now under consideration for the installation of machinery.

Accident Prevention

Safe Use of Hoisting Apparatus

(Prepared for Rock Products by the Engineering Department of the National Safety Council)

THIS is Part 3 of an article begun in the October 23 issue of ROCK PRODUCTS.

Locomotive Cranes

No one piece of equipment is more adaptable for handling material in industrial plants than the locomotive crane. These are coming into use more and more every day because they may be moved to any part of a plant wherever railroad tracks can be laid and because they can handle a great variety of work.

Boilers

Every crane boiler should be provided with a reliable safety valve, a steam gauge, water column, try-cocks, and a gauge glass of a safety type, or one with a reliable gauge glass guard. Safety valves should be tested frequently and boilers inspected periodically.

Electric Equipment

Wherever electric power is used, be sure that the motor is thoroughly protected against the weather and that current carrying parts are guarded against accidental contact, and to prevent the operator being burnt by flashings. Pinion and gear drives should be completely enclosed. A disconnecting switch should be provided, also a suitable circuit-breaker with no voltage release. Track rails should be well bonded and grounded.

Engines

The engine, whether steam or gasoline operated, should be protected by suitable safeguards to prevent operators from accidentally coming in contact with revolving or reciprocating parts.

Cabs

The operator's platform should be of anti-slip plate or of wood to reduce the slipping hazard. A wood-slat mat is effective.

The steam and exhaust piping in cabs should be arranged to provide a clear passageway from one side to the other. Two door-ways should be provided, one on each side of the cab, to permit exit of the operator in case the crane should tip over.

It has been suggested that a heavy wire mesh screen be installed between the winding drum and the operator's station for protection in case the cable breaks.

Capacity Chart

It is recommended that there be conspicuously posted in every crane cab, a chart or table giving the tipping capacity (without outriggers in use) at various positions of the boom, or for various radii of the hoist block. Another chart should give the safe working capacities of the crane with outriggers. It is suggested also that plainly legible capacity plates be attached to each side of the crane cab.

An electric indicator to warn cranemen in case crane is tipping is in use by some companies. This indicator rings an electric bell whenever the crane wheels leave the rail.

Appurtenances

To permit easy and safe access to crane cab, foot steps and handle-holds should be provided on the truck bed and also on the cab.

Automatic couples should be provided on both ends of the crane truck and so arranged that they may be operated by levers from either side of the crane. These couplers should extend far enough to clear the revolving boiler tank.

Every locomotive crane should be equipped with steam or air brakes for the truck wheels. These are especially necessary when working on slippery rails or on a grade, and at all times enable the operator to keep the crane under absolute control.

Many workmen have been killed or seriously injured when they have been caught by the revolving body of a crane and crushed against the truck bed. To guard against such an accident, guard rails, which may be extended to keep men out of the danger zone are recommended.

Many companies have rigid rulings permitting no one but the operator to ride on crane trucks. Others believing that such a ruling is unwise install a foot-board and hand-hold across each end of the truck and permit members of the crew to ride on this foot-board.

Rail clamps should be provided at each corner of the truck. These should be securely attached to the truck to hold it in position while the crane is at work.

Out-riggers should also be provided for use when crane must do work at a considerable distance from the track.

Lighting

It is important that sufficient light be provided in the cab of every crane to enable the operator to see clearly how to perform his work, and especially to see the water and steam gauges distinctly.

Where it is necessary to use a kerosene lamp it should be of substantial metal construction, supported in a permanent, rigid fixture, and fitted with a reflector to direct the light on the gauge glasses and operating levers.

Where electric current is available, electric lamps are of course desirable. A small lamp may be placed over each gauge with a reflector to keep the light out of operator's eyes, or one or more larger lamps, properly located and rigidly supported, may be used.

Where the crane is moved about the plant at night, a headlight and a tail light should be provided. Some companies equip their locomotive cranes with electric search-lights to facilitate working at night.

Operation

Locomotive cranes should not be moved except upon a signal from an authorized signalman. Whenever no signalman or switchman is employed, operator should not move crane except under the orders of the foreman of the department in which the crane is working.

A locomotive crane should not be swung across a railroad track into such a position that cars moving on another track would strike it, until the craneman and the signalman have made sure that cars are not being moved on the adjacent track.

Care must be exercised by the crane operator when passing by corners of buildings or structures that the crane is parallel with the truck and the crane is directly in line with the track so that the boom or body will not strike such building or structure.

When moving crane about the yard, the boom should be carried low enough to clear all overhead wires. It is not advisable that buckets and magnets be carried on the boom when moving from one location to another, although in some cases this must be done.

No one except the switchman or signalman should be allowed to make couplings or throw a switch.

(To be continued)

New Machinery and Equipment

Dragline and Conveyor for Opening Silica Sand Pit

THE SOUTH OTTAWA SILICA SAND CO., Ottawa, Ill., is opening a new silica sand pit by a novel method. The usual method is by means of horses and slip scoops, or with men and wheelbarrows. The method adopted in this case is a combination of a portable 4-ton dragline outfit and a standard Barber-Greene belt conveyor unit.

The two views given illustrate the use of this combination. With the arrangement shown, an average of a 50-ton car an hour has been established, according to the Cebulske brothers, owners of the plant. The four men are employed as follows: One man fires the boiler and operates the cable winches, another tops off the car and pinches it along the track. Two men are needed at the hopper to keep the material feeding on to the belt, but only one would be necessary were it not for the fact that the sand contains many soft lumps which have to be broken.

The belt of the conveyor is 24 in. wide, carried on troughing carriers and driven by a 15-25 "Waterloo Boy" tractor running on kerosene. The standardized construction makes it possible to add sections to the conveyor of lengths of 3, 6, 9, 12 or 15 ft., as desired. The conveyor shown was originally 80 ft. long and has had added to it one section 15 ft. long.

After the pit has been developed the method of pumping the material commonly employed in the Ottawa silica district will be installed.

New Link-Belt Book on the Preparation of Sand and Gravel

A NEW PUBLICATION has just been issued by the Link-Belt Co. covering the subject of plants for washing sand and gravel. It is a 96-page book illustrated with many photographs of completely equipped plants throughout the country.

This book will give the reader a glimpse of the extensive activities of this company in the sand and gravel field. Inasmuch as the Link-Belt Co. is a pioneer builder of elevating and conveying machinery, in adapting it to the handling of sand and gravel, it makes this book of unusual interest to the trade.

Something more than a year ago this company bought out the sand and gravel end of the Raymond W. Dull Co., Chicago, and its products include the well-known Dull conical screen and sand separator.

The new booklet contains quite a valuable discussion of the theory of screening and represents the best thoughts of a considerable staff of engineers.

Not the least valuable feature is a collection of tables giving dimensions and capacities of both belt conveyors and bucket elevators, elevator chains, etc. Accessory equipment made by this company includes locomotive cranes, draglines, scrapers, buckets, car loaders, etc.

The book will be sent to all interested parties upon application to the Link-Belt Co., Philadelphia, Chicago, or any branch of the company.

General view of the new pit of the South Ottawa Silica Sand Co.

Close-up showing arrangement of loading hopper and conveyor

General Market News

West Coast Possibilities for Silica Sand and Limestone Industries

THE DEVELOPMENT OF PLANTS for preserving fruits and bottling juices, an important and growing adjunct of the agricultural industry in the Puget Sound region and other sections of Washington, brings out the urgent need of a glass factory in this vicinity. Such an enterprise could be started with the double advantage of an immediate market and of raw materials in ample supply close by.

The principal ingredients in glass making are silica in the form of sand or quartz, limestone, sodium carbonate and sodium sulphate. The siliceous quartz is found in several localities in Washington. Near Spokane is a mountain of such quartz, only three miles from a railroad. It is estimated to contain several million tons of the material. Lime and limestone deposits are also available in the San Juan Islands, while in Grant County, Washington, are large, undeveloped deposits of soda—sodium carbonate and sodium sulphate.

Typical of the potential demand for goods in this market is the report of one concern near Seattle that it used last year 300 cars of 16-oz. glasses. Another corporation operating in Washington and Oregon bought 125 cars of bottles for juices; while local jobbers dispose of many cars of preserving jars for use in the homes.

Dairymen use about 130 carloads of milk bottles annually, the bulk of their purchases being made in Illinois and Indiana. One pickle company reported that its 1919 requirements included 1200 gross of pickle bottles; 600 gross of mustard bottles; 5000 dozen vinegar bottles; 2500 dozen No. 5 bottles; 2500 dozen pint catsup bottles, and 200 dozen olive oil bottles. Figures secured from jobbers and wholesale grocers by the industrial bureau of the Chamber of Commerce and Commercial Club placed the quantity of glassware for household canning at 38 cars.

Extensive researches reported by one concern led to its estimate that the consumption of glass in Washington and Oregon, exclusive of window and plate glass, is 2000 carloads annually.

This amount would be increased, report the canning factories, if an adequate supply could be assured for placing new varieties of their products in glass, and the tenor of all communications is that Seattle would be the logical manufacturing point for quick distribution.

Old Georgia Cement Company Coming Back to the Fold

THE EMPIRE CEMENT & LIMESTONE CO. is enlarging and overhauling its cement plant at Portland, Ga., preparing to go back into the manufacture of portland cement at an early date.

A part of the plant has been utilized continuously in the manufacture of agricultural limestone, as described in ROCK PRODUCTS about a year and a half ago, This made it possible to keep the organization alive and make many improvements in the crushing plant.

This company has practically all of the equipment for a 1,500 barrel plant, excepting one kiln, and with the installation of an additional kiln, 8½x125 ft. the same size as the one they now have—would equip the plant to produce 1,500 barrels a day. It is understood that negotiations are under way that will provide the necessary capital to put this excellent property into operation very soon, with a considerably increased capacity.

Their general offices are located in the Healey Building, Atlanta, Ga. Wade H. Davis is president and it is due to his management that the company is again prepared to manufacture cement.

Texas Producers Form Mineral Aggregate Association

PRODUCERS of sand and gravel from many parts of the State of Texas met in Waco, November 6, and formally organized the Texas Sand, Gravel and Crushed Stone Association by electing the following officers: President, J. G. Strawn of Dallas; vice-president, J. F. Morris of Gainesville; secretary-treasurer, Rhea Miller of Dallas.

The executive committee consists of the president and the chairmen of the following standard committees: Membership, E. L. Dennis of San Antonio; transportation, O. C. Smith of Fort Worth; specifications, J. J. Potts of Waco; entertainment, Miss H. J. Cummings of Houston.

There will be five members of each standing committee, the remaining four members of the committee to be designated by the president.

The next meeting of the association will be held in San Antonio some time in January.

One of the prominent visitors of the association was V. O. Johnston of Lincoln, Ill., president of the National Association of Sand and Gravel Producers.

Wisconsin, western Missouri and Nebraska are other states which have "mineral aggregate" associations.

New Edition of Sandles' "Dollars and Sense"

ALTHOUGH FIRST ISSUED only about one year ago "Dollars and Sense" is probably the best known little booklet "spreading the gospel limestone" in this country. More than that copies of it have already gone to nearly every country abroad sufficiently civilized to be interested in permanent soil fertility.

A new and revised edition has recently come off the press with all the good things of the original and much new and equally good material. It is tremendously popular with farmers the country over and ROCK PRODUCTS was not far off a year ago, when it predicted a popularity of the kind enjoyed by Ben Franklin's "Poor Richard's Almanack."

It is presumed Secretary A. P. Sandles, National Agricultural Limestone Association, 405 Hartman Building, Columbus, Ohio, will send a sample copy to any interested "agstone" producer.

Removal of Spanish Import Duty on Cement

A CABLEGRAM from Trade Commissioner W. M. Strachan, at Madrid, November 4, 1920, states that the Spanish Government has removed the import duty of 0.50 peseta per 100 kilos ($0.043 per 100 pounds) until further notice, effective from December 1, 1920. Cement will be subject to an export duty of 5 gold pesetas per 100 kilos. (Peseta =$0.193; 100 kilos=220.46 pounds.)

Gypsum Deposit at Le Roy, New York, to Be Developed

GEORGE J. RALPH, of Akron, N. Y., has leased 3,000 acres of land north of Le Roy, Genesee County, New York, in which test drill holes show, is a 10-ft. vein of the finest quality of gypsum.

The Ralph Gypsum Co. has been incorporated and plans are being formulated to sink a shaft and build a mill for the production of gypsum on a large scale.

The fact that Mr. Ralph, in spite of almost insurmountable difficulties promoted successfully the gypsum operations on the Wilder farm in Akron, which are now producing hundreds of tons of gypsum daily, is president of Ralph Gypsum Co. is a guarantee that the business will be established on a permanent basis.

A 10-ft. vein of gypsum is a rare find and stock in the Ralph Gypsum Co. is already reported selling rapidly at par.

General Market News

Portland Cement Association Opens Vancouver, B. C., Office

THE PORTLAND CEMENT ASSOCIATION announces the opening of a Canadian office in the Birks Building, 718 Granville street, Vancouver, B. C., in charge of A. E. Foreman as district engineer.

Mr. Foreman, who is a native of Canada, has since 1890 made his home in British Columbia where he has become well known through numerous engineering connections, last of which was Chief Engineer of the Department of Public Works, Victoria, B. C., which position he resigned to join the forces of the Portland Cement Association.

Mr. Foreman was graduated from McGill University in 1903. After a year's travel and several years spent in accumulating general business experience, he formed a connection with the Concrete Engineering & Construction Co. of Vancouver, of which firm he was Secretary and General Manager from 1907 to 1909. For a year following, he was a member of the firm of Dutcher & Foreman, Consulting Engineers of Vancouver. Since 1910 he has had various engineering connections, among which are the following: Resident Engineer in charge of construction of Hydro Electric Power Development at Revelstoke, B. C.; Supervising Engineer on special harbor work for Victoria, B. C.; Assistant City Engineer, Victoria, B. C.

In addition to his many other activities, Mr. Foreman finds time to maintain official relations with a number of engineering and other societies, and at the present time is President of the Canadian Good Roads Association.

Feldspar and Phosphate Used in Manufacture of Potash

FELDSPAR from North Carolina and Tennessee phosphate rock will be used in the manufacture of potash by the Emporium Phosphate Co., of Emporia, Va.

Two hundred thousand dollars will be invested for the initial works, and an 800 by 150 ft. mill building has already been purchased. The process of manufacture is said to have been discovered by A. L. Kreiss, a California engineer, who states that feldspar, phosphate rock and a soda flux will fuse at 850° C.

The development of this industry means important advantages for fertilizer manufacturing interests of the United States as it is expected to make them independent of German potash supplies when the commercial success of the feldspar process has been fully demonstrated.

All of Michigan Needs Agricultural Lime

A RECENT REPORT of M. M. McCool, in a Michigan Agricultural Experiment Station Bulletin, states that examination of large numbers of soil samples from widely different sections of Michigan led to the conclusion that few of the surface soils of this state, aside from those deposited in former lakes, contain calcium carbonate except in the form of rather large fragments. A summary of several experimental field projects on the use of lime on acid soils indicates that it is not unusual for the returns from the first crop of the soils limed to pay for the cost of application. Data on the effect of ground limestone and hydrated lime on the available elements of plant food in four different soils show that lime, when applied to these soils, was quite active in increasing the availability of calcium, sodium, magnesium, sulphur, and also phosphoric acid.

New Chemical Use of Lime for Insecticides Gaining in Favor

AN IDEA of the benefit gained by application of the calcium arsenate treatment developed and recommended by the United States Department of Agriculture against the cotton-boll weevil is found in the experience of a large planter at Tallulah, La. With the exception of certain test plats, this man's entire acreage was dusted with calcium arsenate, the cost being $9.20 an acre. He obtained an average yield of 1,215 pounds of seed cotton to the acre on the land surrounding the test plats, while these unpoisoned test plats average only 300 pounds, or about 25 per cent of the yield on the poisoned cotton. Thus his net profit from poisoning on these areas on sales made before declining prices of cotton was about $120 an acre.

For making calcium arsenite high calcium lime is required.

Limestone Used in Manufacture of Mineral Wool

THE LIMESTONE SOLD for the manufacture of "mineral wool" in 1918 amounted to 25,640 short tons, valued at $37,082, an increase of 13,610 tons in quantity and of $28,264 in value. Mineral wool is manufactured from low-magnesium argillaceous limestone quarried near Yorktown, Delaware County, and Alexandria, Madison County, Ind., and is used as an insulating material, notably in refrigerators and fireless cookers and many similar uses.

October Building Operations

PROLONGATION of the period of business uncertainty caused a slump in building operations in October, according to statistics compiled by the F. W. Dodge Co. Contracts awarded during October in the twenty-five states comprising the northeastern quarter of the country amounted to $177,791,000, which was $28,000,000 less than the September figure.

The decline was general throughout the territory, except in the Northwestern States, Minnesota and North and South Dakota, which showed an increase over September.

In spite of the relative inactivity of recent months, the total amount of money involved in building operations during the first ten months of this year has amounted to 10% more than the amount for the same period last year.

Since January 1, 1919, the country has run one-third of a year behind on its announced construction program.

Since there was before 1919 a great shortage of construction, the present deficiency probably amounts to the construction activity of one and one-half normal years.

It is this deficiency that is the outstanding feature of the situation. This accumulated demand for construction has been dammed up by instability of the material and labor market, by tightness of the money market, and by transportation difficulties.

Just as soon as these conditions are sufficiently improved, the pressure of demand will break through the log-jam and will become the dominating factor, resulting in a great resumption of activity.

Cement Companies Answer State Charges

THREE cement companies—defendants in ouster suits filed more than a year ago by the attorney general's office of Kansas—have filed answers in the supreme court. The answers cover 189 questions presented on behalf of the state.

Answers of the companies go into details of their business in this state. The information was asked by the attorney general in connection with his prosecution of the suit alleging illegal combinations and agreements in restraint of trade and in violation of the Kansas anti-trust laws.

The three companies which recently filed answers are the Fredonia, Western States and the Great Western.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton. F. O. B., at producing plant or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:			1.40 per net ton, all sizes			
Buffalo, N. Y.			2.50	2.00	2.00	
Burlington, Vt.	1.00					
Califon, N. J.	1.80	2.25	2.00	1.80	1.80	
Chaumont, N. Y.	1.75	1.75	1.75	1.50	1.50	1.50
Coldwater, N. Y.	1.80	1.80	1.80	1.65	1.65	2.00@2.25‡
Grove, Md.	1.45	2.50	2.40	2.00	1.60	1.45
North Leroy and Akron, N. Y.	1.25	1.25	1.25	1.25	1.25	1.25
Redington, Pa. (dolomite)	1.35	1.35	1.85	1.85	1.85	1.85
Utica, N. Y.	1.00		All other sizes 1.50			
Vernoy, N. J.	2.00	2.25	2.00	1.80	1.60	
CENTRAL						
Alden, Ia.	1.00		1.50	1.45	1.45	
Alton, Ill.	2.50		2.00	2.00	1.75	
Bettendorf, Ia.			All sizes, 1.75 cu. yd.			
Buffalo, Ia.		1.35	1.45	1.25	1.25	1.35
Chicago, Ill.	1.58	1.90	1.70	1.58	1.58	1.58
Cincinnati, Ohio		2.00	2.00	2.00		
Cleveland, Ohio		2.40	2.20	2.20		
Columbia, Ill.	2.15	1.90	2.00	2.00	1.90	1.90
Coralville, Ia.	1.25	1.60	1.55	1.50	1.40	
Davenport, Ia.	1.50*	1.50*	1.50*	1.50*		
Dundas, Ont.	.75	1.50	1.50	1.35	1.25	1.20
Eden and Knowles, Wis.	1.30	1.30	1.30	1.30	1.30	
Ft. Wayne, Ind.	1.60	1.90	1.90	1.80	1.60	1.60
Greencastle, Ind.	1.25@1.50	1.35	1.25	1.10@1.20	1.10	1.10
Illinois, Southern	2.25	1.75	1.75	1.75	1.50	
Kansas City, Mo.	.60	2.00				
Kokomo, Ind.	1.10	1.10	1.25	1.20	1.10	1.10
Krause or Columbia, Ill.	1.80	1.30	1.50	1.40	1.30	1.30
Lannon, Wis.	1.25	1.25	1.25	1.25	1.25	1.25
Lima, Ohio	1.70	1.60	1.50	1.50	1.50	1.50
Linwood, Ia.	1.00		1.45	1.25	1.25	
Mansfield, Ohio	1.70	2.20	2.00	1.90	1.70	1.70
Mayville, Wis.	.95@1.00		1.20	1.20	1.20	1.20
Montrose, Ia.	1.25	1.75	1.75	1.65	1.65	1.65
Oshkosh, Wis.			1.40 per ton, all sizes			
Ottawa, Can.	3.00	3.25	3.40	2.75	2.50	
River Rouge, Mich.	1.25	1.50	1.50	1.50	1.25	1.25
St. Louis, Mo.	.60	1.60				
Sheboygan, Wis.	1.30	1.30	1.30	1.30	1.30	1.30
Stone City, Ia.	.80		1.65	1.55	1.45	
Toledo, Ohio, f. o. b. cars	1.85	2.10	2.10	2.10	1.85	1.85
Toronto, Canada	1.75	2.40	2.40	2.40	2.15	2.15
Winnipeg, Can.	2.90*		3.25*	2.90*		
SOUTHERN:			These prices include 90c freight			
Cartersville, Ga.	2.50	2.50	2.50	2.50	2.50	2.50
Chickamauga, Tenn.	1.50	1.75	1.75	1.75	1.75	1.75
Columbia, S. C.	1.00@1.25	3.50	3.50	3.50		
El Paso, Tex.	1.00	1.00	1.00	1.00		
Fort Springs, W. Va.	1.85	2.00	2.00	1.85	1.65	1.50
Garnett, Okla.	.65		1.75	1.75	1.60	
Mascot, Tenn.		1.50	2.00		1.50@2.00	
New Braunfels, Tex.	.60	1.75	1.75	1.50	1.50	1.50
WESTERN:						
Atchison, Kans.	.50		2.10	2.10	2.10	
Blue Springs and Wymore, Neb.	.20	1.95	1.95	1.85@1.90	1.75@1.80	1.70
Kansas City, Mo.	.60	2.00				
Duluth, Minn.	1.00	2.25	2.00	1.50	1.50	1.50

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Bernardsville, N. J.	2.00	2.20	2.00	1.80	1.50	
Branford, Conn.	.80	1.75	1.65	1.45	1.25	
Birdsboro, Pa.	1.40	1.90	1.80	1.60	1.40	1.40
Bound Brook, N. J.	2.10	2.30	2.00	1.85	1.70	
Dresser Jct., Wis.	.75	2.45	2.45	2.15	2.00	2.00
Duluth, Minn.	1.00	2.50	2.00	1.50	1.50	1.50
E. Summit, N. J.	2.10	2.35	2.15	1.85	1.80	
Glen Mills and Rock Hill, Pa.	1.60	1.90	1.90	2.25	2.10	1.90‖
New Britain, Middlefield, Rocky Hill, Meriden, Conn.	.60@1.00	1.60@1.80	1.60@1.80	1.40@1.50	1.20@1.30	
Oakland, Calif.	1.15	1.15	1.15	1.15	1.15	1.15
San Diego, Calif.	.50@ .70	1.45@1.75	1.40@1.70	1.30@1.60	1.25@1.55	
Westfield, Mass.	.60	1.35	1.30	1.20	1.10	
Winchester, Mass.	.85	.85	.85	2.10	1.85	1.60

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Dundas, Ont.—Flint	1.10	1.10	1.10	1.10	1.10	1.10
Hendlers, Pa.—Quartzite	.90	.90	1.20	1.45	1.35	1.10
Holton, and Bolingbroke, Ga.—Granite	.40		2.75	2.50	2.25	2.25
Little Falls, N. Y.—Syenite	.90	1.30	1.30	1.50	1.40	1.30
Middlebrook, Mo.—Granite	4.00		2.00	2.00		1.50‡
Ottawa, Can.—Granite	5.50	5.00	5.50	5.00		
Stockbridge, Ga.—Granite	.50	2 00	1.90	1.75	1.75	
White Haven, Pa.—Sandstone	1.20	1.70	1.70	2.00	1.85	1.70

*Cubic yard. †Agrl. lime. ‖R. R. ballast. ‡Flux. ‡Rip-rap. a 3-inch and less

Agricultural Limestone

EASTERN:

Coldwater, N. Y.—Analysis, 56.77% $CaCo_3$, 41.74% $MgCo_3$—70% thru 200-mesh, 95% thru 40-mesh; bags, $5.00; bulk — **3.25**

Chaumont, N. Y.—Analysis: $CaCo_3$, 92 to 98%; $MgCo_3$, 1.51%—(Thru 100 mesh); sacks, 4.50; bulk — 2.75

Gasport, N. Y.—90% thru 50 mesh, bulk, 2.50; bags — 4.25

Grove City, Pa.—Analysis: $CaCo_3$, 94.75%; $MgCo_3$, 1.20%—(70% thru 100 mesh); 80 lb. ppr., 5.50; bulk — **4.50**

Grove, Md.—(50% thru 50 mesh); paper bags, 6.50; bulk — 4.50

Hillsville, Pa.—Analysis, $CaCo_3$, 96% (70% thru 100 mesh); sacks, 5.00; bulk — **3.25**

Jamesville, N. Y.—Analysis, $CaCo_3$, 89.25%; $MgCo_3$, 5.25%; bulk, 2.75; sacks — 4.50

Syracuse, N. Y.—Analysis, 90% carbonates (50% thru 100 mesh, 90% thru 50 mesh); sacks, 3.50; bulk — **2.75**

Walford, Pa. (50% thru 100 mesh; 60% thru 50; 100% thru 10); sacked, 5.00; bulk — 3.25

West Stockbridge, Mass.—Analysis: Combined carbonate, 95%—33% thru 200 mesh; 66% thru 100; 100% thru 40. Bulk — **2.85**

Williamsport, Pa.—Analysis, $CaCo_3$, 88-90%; $MgCo_3$, 3-4%—(50% thru 50 mesh); bulk — 4.00@5.50

CENTRAL:

Alden, Ia.—Analysis, $CaCo_3$, 99.16% — **.80**

Alton, Ill.—Analysis: $CaCo_3$, 96%; $MgCo_3$, 0.75%—90% thru 100 mesh — 9.00

Bedford, Ind.—(90% thru 10 mesh) Analysis, $CaCo_3$, equivalent 98.5% — **2.00**

Belleville, Ont.—Analysis, $CaCo_3$, 90.9%; $MgCo_3$, 1.15% (45 to 50% thru 100 mesh; 61 to 70% thru 50 mesh); bulk — **2.50**

Chicago, Ill.—Analysis, $CaCo_3$, 53.63%; $MgCo_3$, 37.51%—90% thru 50 mesh — 1.50

Columbia, Ill., near East St. Louis (½-in. down) — 1.25@1.80

Elmhurst, Ill.—(Analysis, $CaCo_3$, 35.73%; $MgCo_3$, 20.69%) 50% thru 50 mesh — 1.25

Greencastle, Ind.—(Analysis $CaCo_3$, 98%), 50% thru 50 mesh — 2.00

Howenstein, O.—100% thru 10 mesh; 59% thru 50; 39% thru 100 — **2.75@3.00**

Lannon, Wis.—(90% thru 50 mesh) Analysis, 54%, $CaCo_3$; 44%, $MgCo_3$ — **2.00**

Marblehead, O.—(Analysis: $CaCo_3$, 95.33%) 100% thru 100 mesh, sacks, 5.25; bulk — **3.00**

Mayville, Wis.—$CaCo_3$, 53.65%; $MgCo_3$, 43.72% — 1.75@2.00

McCook, Ill.—Analysis, $CaCo_3$, 54.10%; $MgCo_3$, 45.04%—100% thru ¼-in. sieve; 78.12% thru No. 10; 53.29% thru No. 20; 38.14% thru No. 30; 34.86% thru No. 50; 22% thru 100 — **1.50**

Milltown, Ind.—(Analysis, $CaCo_3$, 94.41%; $MgCo_3$, 2.95%); 28% thru 100 mesh; 25.2% thru 200 mesh; 34.4% thru 50 mesh — 1.65

Montrose, Ia.—(90% thru 100 mesh) — **1.25**

Piqua, O.—Analysis: CaCo., 82.8%; $MgCo_3$, 8.2%; neutralizing power in terms of calcium carbonate, 95.3%—50% thru 100 mesh — 3.50@5.50

50% thru 50 mesh — 1.75@2.00

Ridgeville, Ind.—(Analysis $CaCo_3$, 98%), 100% thru 4 mesh — **1.75**

River Rouge, Mich.—Analysis: $CaCo_3$, 54%; $MgCo_3$, 40%; bulk — .80@1.40

Stolle, Ill. (near East St. Louis on I. C. R. R.)—(Thru ½-in. mesh) Analysis, $CaCo_3$, 89.61 to 89.91%; $MgCo_3$, 3.82% — 2.25

St. Paul, Ind.—Analysis, $CaCo_3$, 85%; $MgCo_3$, 12% — 1.50

Stone City, Ia.—Analysis, $CaCo_3$, 98% (50% thru 100 mesh) — .80

Toledo, O.—Analysis, $CaCo_3$, 52.72%; $MgCo_3$, 43%—(20% thru 100 mesh); 30% thru 50; 80% thru 100; 100% thru 5/32 screen) — 1.80

Whitehill, Ill.—**Analysis, $CaCo_3$,** 97.12%; $MgCo_3$, 2.50%—

50% thru 100 mesh — **5.00**

50% thru 50 mesh — 2.25

(Continued on next page.)

Agricultural Limestone

(Continued from preceding page.)

SOUTHERN:

Cartersville, Ga.—Analysis: 96% combined carbonates—90% thru 100 mesh 3.00

Claremont, Va. (Marlime)—Analysis, 90.94% $CaCo_3$, 0.31% P., 1.36% Mg., 0.37% K.; bulk 4.50
100 lb. ppr. bags 6.00
100 lb. cloth bags 6.50

Dittlinger, Tex.—Analysis, $CaCo_3$, 99.09%; $MgCo_3$, .04%—
90% thru 100 mesh 2.00
90% thru 4 mesh 1.00

Grovania, Ga.—Analysis, $CaCo_3$, 95%; $MgCo_3$, none—50% thru 100 mesh 3.00

Hopkinsville, Ky.—Analysis, 94.6 to 98.1% $CaCo_3$—Bulk 2.00

Knoxville, Tenn.—Pulverized 2.50
90% thru 100 mesh 3.00

Linnville Falls, N. C.—Analysis, $CaCo_3$, 53%; $MgCo_3$, 42%—50% thru 100 mesh; sacks, 4.50; bulk 3.00

Marion, Va.—Analysis, 90% $CaCo_3$—(50% thru 100 mesh) 2.50

Memphis Jct., Ky.—(Analysis, $CaCo_3$, 95.31%; $MgCo_3$, 1.12%); average price, ½ in. down 2.00

Mascot, Tenn.—Analysis, $CaCo_3$, 52%; $MgCo_3$, 38%.
(80% thru 100 mesh) 3.00
(All thru 10 mesh) 2.50
(80% thru 200 mesh) 5.00
Paper bags, $1.50 extra per ton; burlap, 2.00 extra per ton.

Maxwell, Va. 2.50

Mountville, Va.—Analysis, $CaCo_3$, 76.6%; $MgCo_3$, 22.83%—50% thru 100 mesh; 100 lb. ppr., 7.00; bulk .. 5.00

Ocala, Fla.—Analysis, $CaCo_3$, 98%—(75% thru 200 mesh) 4.50

Tyrone, Ky.—Analysis, $CaCo_3$, 90%; $MgCo_3$, 4%—90% thru 4 mesh ..... 1.75@2.25

WESTERN:

Cement, Calif.—Analysis, $CaCo_3$, 95%; $MgCo_3$, 2%—(50% thru 50 mesh) 5.00

Colton, Calif.—Analysis: $CaCo_3$, 95%; $MgCo_3$, 1½% (all to pass 14 mesh)—bulk, 3.50; bags 4.50
Sacks, 15c extra, returnable.

Kansas City, Mo., Corrigan Sid'g—50% thru 50 mesh; bulk 2.00

Oro Grande, Calif.—Analysis: $CaCo_3$, 94%; $MgCo_3$, 2%; 85% thru 200 mesh; $4.00, bulk; bags 10.25

Terminus, Calif.—Analysis, 96.4% $CaCo_3$, 1.3% $MgCo_3$—(60% thru 200 mesh; 80% thru 100 mesh; 100% thru 50 mesh); sacks, 6.00; bulk 5.25

Tulsa, Okla.—90% thru 4 mesh ..... .65

Miscellaneous Sands

Silica sand is quoted washed, dried and screened unless otherwise stated.

GLASS SAND:

Berkeley Springs, W. Va. ..... 3.00@3.50
Bridgeton, N. J.—Washed, 2.50; dried 3.00
Cedarville and South Vineland, N. J.—Damp, 2.00; dry 2.50
Columbus, Ohio ..... 2.50@3.00
Gray Summit, Mo. ..... 2.50@4.00
Hancock, Md.—Damp 2.00
Klondike and Pacific, Mo. ..... 2.50@4.00
Leesburg, Pa.—Core, and molding coarse 3.00
Mapleton, Pa.—Dry 4.00
Glass, damp 3.00
Massillon, Ohio 3.50
Millington, Ill. ..... 2.25@3.00
Mineral Ridge, Ohio 4.00
Montoursville, Pa.—Green, washed ..... 2.00@2.75
Morgantown, W. Va. ..... 3.00@3.25
Oregon, Ill.—Large contracts ..... 2.00@2.50
Ottawa, Ill. 2.50
Pittsburgh, Pa.—Dry, 4.00; damp 3.00
Robinson, Md.—Washed, damp 2.00
Rockwood, Mich. ..... 3.00@4.00
Round Top, Md.—Glass and damp, $2.50; core 2.25
St. Marys, Pa.—Green 3.00
Sands, Elk Co., Pa.—Selected, green .. 2.75
Thayers, W. Va.—Washed 3.00
Tygarty, Ky.—Washed, not dried 2.60
Utica, Ill. ..... 1.75@2.50

FOUNDRY SAND:

Albany, N. Y.—
Molding, fine and coarse ..... 3.00@4.00
Brass molding ..... 3.00@4.00
Core ..... 1.50@2.50
Sand blast ..... 3.50@5.00
Allentown, Pa.—Core ..... 1.50@1.75
Molding coarse ..... 1.50@1.75
Arenzville, Ill.—Molding fine ..... 1.80@2.25
Beach City, Ohio—Core ..... 3.00@3.50
Furnace lining ..... 3.50@4.00
Molding fine and coarse ..... 3.00@3.50
Sand blast ..... 3.50@4.00

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F. O. B., at producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ¼ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Ambridge, South Heights, Pa.		**1.30**		**1.30**	**1.00**	**1.00**
Attica, N. Y.	**.75**	**.75**	**.75**	**1.00**	**1.00**	**1.00**
Erie, Pa.		1.00	1.15		1.25	
Farmingdale, N. J.	.48	.48			1.40	
Hartford, Conn.	**.90**		**1.25**	**1.15**	**1.15**	**1.15**
Leeds Junction, Me.		.60@ .75	2.00	1.75	1.65	1.50
Ludlow, Mass.	**.75•**	**.75•**	**1.70**		**1.50•**	**1.50•**
Pittsburgh, Pa.		1.30	1.30		1.00	
Washington, D. C.	**.75**	**.75**	**2.00**	**1.40**	**1.20**	**1.20**
York, Pa.		1.10@1.30	(crushed gravel)			
CENTRAL:						
Alton, Ill.	.60@ .75	.60@ .75	1.50@4.50	1.30	1.20	1.20
Attica and Covington, Ind.	1.00	1.00	1.00	1.25	1.25	1.25
Barton, Wis.	.70	.70		.80		.80
Chicago, Ill.		1.75@2.33	1.75@2.33			
Cincinnati, O., and vicinity	1.20	1.15	1.15	1.15	1.15	2.00
Columbus, O.		.70@1.25	1.00@1.25	.80@1.25	.80@1.25	.70@1.25
Des Moines, Ia.	**1.00**	**.75**	**1.65**	**1.65**	**1.65**	**1.65**
Detroit, Mich.		.70		.85 (64/40)		.95
Earlestead (Flint), Mich.	**.60**	**.70**		**1.05**	**.95**	**.95**
Eau Claire, Wis.	**.60**	**.60**	**1.35**		**1.10**	
Elkhart Lake, Wis.	**.75**	**.60**	**1.00**	**.84**	**.84**	**.84**
Grand Rapids, Mich.		.60		.90	.85	.85
Greenville, Mechanicsburg, O.	**.80**	**.70**	**.80**	**1.00**	**.85**	**.80**
Humboldt, Ia.	**1.00**	**.85**	**1.90**	**1.90**	**1.90**	**1.90**
Indianapolis, Ind.	**.60**	**.60**		**1.50**	**.75**	**.75**
Janesville, Wis.		.80			.90	
Lincoln, Neb.	Sand .80, sand and gravel 1.30, drained for shipment					
Mason City, Ia.	**1.00**	**.90**	**2.00**	**1.85**	**1.85**	**1.75**
Milwaukee, Wis.	1.55	1.55	1.60	1.60	1.60	1.60
Minneapolis, Minn.	.50	.50	2.00	2.00	1.75	1.50
Pittsburgh, Pa.		1.30	1.30		1.00	1.00
Riton, Wis.		.85				.85@1.00
Saginaw, Mich., f. o. b. cars	**1.30**	**1.30**	**2.20**	**1.95**	**1.85**	**1.85**
St. Louis, Mo., f. o. b. cars	1.95	1.65	1.85	1.65	1.60	1.60
Summit Grove, Clinton, Ind.	1.00	1.00	1.00	1.00	1.00	**1.00**
Terre Haute, Ind.	1.00	1.00	1.25	1.25	1.25	1.25
Toledo, Ohio	**.75**	**.75**				
Winnipeg, Can.			All sizes 1.20			
Yorkville, Moronts, Oregon and Sheridan, Ill.	.90@1.00	.90@1.00	.90@1.00	.90@1.00	.90@1.00	.90@1.00
SOUTHERN:						
Flomaton, Ala.		1.00		2.25		
Ft. Worth, Tex.	2.00@2.25•	2.00@2.25•	2.75@3.00•	2.75@3.00•	2.75@3.00•	
Jedburg, Mo.		1.05	1.20@1.45	1.00	1.00	.95
Knoxville, Tenn.	**1.25**	**1.25**	**1.65**	**1.65**	**1.65**	**1.50**
Lake Weir, Fla.		**.75**				
Macon, Ga.		.75@1.00				
Memphis, Tenn.	**1.40**	**1.40**	**1.50**			**1.50**
N. Martinsville, W. Va.		1.40				1.20
New Orleans, La.	1.00		1.75			
Pelzer, S. C.	**.90**					
Pine Bluff, Ark.	1.25	.92	Washed gravel, all sizes, 2.10			
Tulsa, Okla.		**.70**				
Waco, Texas	**.70@ .80**	**.70@ .80**				**1.10**
WESTERN:						
Grand Rapids, Wyo.	**.50**	**.50**	**.85**	**.85**	**.80**	**.80**
Kansas City, Mo.	(Kaw River sand, car lots, .75 per ton, Missouri River, .85)					
Niles, Calif.	**1.00**	**1.00**	**.90@1.10**	**.85@1.00**	**.85@1.00**	**.85@1.00**
Porteau, B. C.	1.30	1.30	1.30			1.20
Pueblo, Colo.	.95	.90				2.00
Roseburg, Ore.	2.00	1.75	2.00	1.75	1.75	1.75
San Diego, Calif.	.80@1.00	.80@1.00	1.30@1.60	1.25@1.55	1.25@1.45	1.10@1.40
San Francisco, Calif.		**1.00**	**1.00@1.20**	**.85@1.00**	**.85@1.00**	**.85@1.00**
Saratoga, San Jose, Calif.		**.60@ .75**	**.60@ .70**	**.60@ .70**	**.60@ .70**	**.60@ .70**
Seattle, Wash.	1.25	1.25	2.00	1.25	1.25	1.25
Vancouver, B. C.		**1.30•**		**1.30•**		**1.20•**

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 inch down	Sand, ¼ inch and less	Gravel, ½ inch and less	Gravel, 1 inch and less	Gravel, 1½ inch and less	Gravel, 2 inch and less
EASTERN:						
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Glenville, N. Y.				1.00•		
Hartford, Conn.		1.00•				
Yardville, N. J.		**.50@ .75**				
York, Pa.		1.00@1.30		(crushed rock sand)		
CENTRAL:						
Attica, Covington, Silverwood, Ind., and Palestine, Ill.	.85	.85	.85	.85	.85	.85
Cherokee, Hawarden, Ia.			.80 per ton—1.20 washed			
Elkhart Lake, Wis.			.90 per ton (washed concrete material)			
Ft. Jefferson, Mechanicsb'g, O.	**.70**	**.60**	**.60**			
Hersey, Mich.	.60			.60	.60	
Janesville, Wis.		.65			.75	
Lincoln, Neb.			Sand gravel mix, 1.30			
Oxford, Mich.						.85@ .95
Saginaw, Mich., f. o. b. cars		.75	1.30	1.30	1.30	1.30
St. Louis, Mo., f. o. b. cars						1.75
Summit Grove, Ind.	**.65**	**.65**	**.65**	**.65**	**.65**	**.65**
Yorkville, Oregon, Moronts and Sheridan, Ill.						.80@ .90
SOUTHERN:						
Albany, Ga.	.70@1.00					
Dudley, Ky. (Crushed Sand)		1.15		1.10		
Lindsay, Tex.	1.50				.50	
Valde Rouge, La.						.60@ .75
Waco, Texas		.80		1.50		1.30
WESTERN:						
Roseburg, Ore.	1.75	1.50	1.75	1.50	1.50	1.50
Saratoga, San Jose, Calif.		**.60@ .75**	**.60@ .70**	**.60@ .70**	**.60@ .70**	**.60@ .70**
Yorkville, Ore.		.40			.40	

* Cubic yard. B Bank. L Lake. || Ballast.

Crushed Slag

City or shipping point	Roofing	¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:							
Bethlehem and Emaus, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Buffalo, N. Y.	2.35	1.30	1.30	1.30	1.30	1.30	1.30
E. Canaan, Conn.	4.00	1.00	2.50	1.35	1.25	1.25	1.25
Eastern Pennsylvania and Northern New Jersey	2.50	.90	1.50	1.10@1.25	1.10@1.25	1.10@1.25	1.10@1.25
Erie, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Emporium, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Hokendaugua and Donaghmore, Pa.	2.50	.90	1.50	1.20	1.20	1.20	1.20
Lebanon, Pa.	2.50	.85	1.50	.85	.85	.85	.85
Sharpsville and Struthers, Pa.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
Western Pennsylvania	2.50	1.25	1.25	1.25	1.25	1.25	1.25
CENTRAL:							
Chicago, Ill.	All sizes, $1.50, F. O. B. Chicago						
Detroit, Mich.	All sizes, 1.65, F. O. B. Detroit						
Ironton, Jackson, O.	2.00	1.35	1.35	1.35	1.35	1.35	1.35
Toledo, O.	2.20	1.70	1.95	1.95	1.95	1.70	1.70
Youngstown, Dover, Hubbard and Leetonia, O.	2.00	1.30	1.70	1.30	1.30	1.30	1.30
SOUTHERN:							
Alabama City, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Ensley, Ala.	2.05	1.00	1.25	1.25	1.25	1.00	.95
Longdale, Goshen, Glen Wilton and Low Moor, Va.	2.50	1.00		1.25	1.25	1.15	1.05

Agricultural Lime and Hydrate

	—Agricultural Lime— Bulk	Bags	Per Cent CaO	Per Cent MgO	Agricultural Hydrate Bags
EASTERN:					
Adams, Mass.			98	38	8.00
Bellefonte, Pa.	10.50		95.5	.72	11.50
Berkeley, R. I.			50	18	15.00
Branchton, Pa.		5.50			
Cavetown, Md.	8.50				
Cedar Hollow, Devault, Rambo and Swedeland, Pa.	10.50		45.50	30.50	13.00
Chippewa, Pa.	6.50@7.00		78.67	1.33	
Farnams, Mass.	6.50	8.00	60	2	
Frederick, Md.	7.75		88	5 to 8	10.50
Grove, Md.	8.00				10.75
Highgate Springs, Vt.	6.00		85	2	8.00
Hyndman, Pa.	5.00	8.50	80.23	2.87	
Lime Kiln, Md.	9.50	13.50			13.50
Lime Ridge, Pa.	5.25@6.50		80.56-62.56	3.87-1.75	
Mt. Union, Pa.	6.25		93.69		
Newburgh, N. Y.			57	38	8.00
New Castle, Pa.	3.50	4.50	47.6 to 50.4	0.62 to 1.12	
Paxtang and Lemoyne, Pa.	4.00@6.00		60	12	
Rosendale, N. Y.	8.00	9.00	92	5	
Union Bridge, Md.	11.00	5.50	73	1	13.00
Williamsport, Pa.	6.25	12.00	84-87	2-3	12.00
West Rutland, Vt.	5.50	8.00	68	3	
West Stockbridge, Mass.	3.35	5.35			12.00
York, Pa.	10.50		70	3	13.00
CENTRAL:					
Alton and Hannibal, Ill.	11.50		95		
Delaware, O.			50.0	12	13.50
Knowles and Valders, Wis.	4.00	9.00	55	45	13.00
Manistique, Mich.	11.00		95	2	11.00
Marblehead, O.					13.00
Mitchell, Ind.					13.50
Sheboygan, Wis.	5.50	8.50	58	40.5	
Woodville, Ohio	7.00	9.00	48	36	13.00
SOUTHERN:					
Blowers, Fla.	5.50		98.5		
Burns, Tenn.	10.00		96	0.54	14.00
Chippewa, Fla.	5.00		80.0	15.0	
Claremont, Va.	5.00	7.00	85-95	2-5	
Dittlinger, Texas		9.00@11.00	98.62	0.29	12.50@15.00
Erin, Tenn.	11.00		97.82	0.12	
Knoxville, Tenn.	12.00		98.5	.05	15.00
Lushing, Va.	9.00	11.25	60	15	12.75
Maxwell, Va.	6.50		84		6.50
Newala, Ala.	8.10		99.33		
Ocala, Fla.	4.00	6.00 pulv.	98½ (dry basis)		
Staunton, Va.	9.00	11.50	80.00	15.00	
WESTERN:					
Colton, Calif.	15.00		97	2	
Kirtland, N. Mex.	12.00				
San Francisco, Calif.		15.00	97	0.33	15.00
Tehachapi, Cal.	6.00	8.00	96	2	

Miscellaneous Sands

(Continued from preceding page)

Bowmantown, Pa.—Core	1.35@1.50
Molding, coarse	1.70
Bridgeton, N. J.—Core	2.00
Cleveland, O.—Molding coarse	2.00@2.50
Brass molding	2.00@2.50
Molding fine	2.00@2.50
Core	1.25@1.50
Columbus, O.—Core	1.00@3.00
Brass molding	3.50@4.00
Glass sand	3.00
Molding fine and coarse	3.00
Conneaut, O.—Molding fine	2.25@2.50
Molding coarse	2.00@2.25
Delaware, N. J.—Molding fine	2.00
Molding, coarse	1.90
Brass Molding	2.15
Eau Claire, Wis.—Core	.60@ .70
Sand blast, wet	1.75@2.25
Sand blast, dry	3.00@3.50
Traction	.60@ .70
Fleetwood, Pa.—Furnace lining	2.25
Franklin, Pa.—Traction	2.25
Brass molding	2.50
Core	3.00
Molding fine	3.00
Molding coarse	3.00
Sand blast	5.00
Greenville, Ill.—Molding coarse	2.00@2.25
Hancock, Md.—Core and brass mldg.	1.65
Hellam, Pa.—Core	2.00@2.50
Joplin, Mo.—Stone sawing, flint	1.25
Kansas City, Mo.—Missouri River core	.80
Klondike and Gray Summit, Mo.—Molding fine	2.00@3.00
Mapleton, Pa.—Core, furnace lining, molding fine and coarse damp	2.50
Core, furnace lining, moulding, fine and coarse, dry	3.00
Massillon, O.—Molding fine	4.00
Core and molding, coarse	3.50
Glass sand	4.00
Traction	3.50
Furnace lining	4.00
Michigan City, Ind.—Core, bank	.75
Millington, Ill.—Glass and core	2.25
Core sand	2.25
Furnace lining	2.50
Roofing sand	2.25
Stone sawing	2.25
Mineral Ridge, O.—Core, molding sand blast, roofing, etc., washed screened (damp)	3.25
Montoursville, Pa.—Core and traction	1.50@2.00
Brass molding	1.75@2.25
Glass sand	2.00@2.75
New Lexington, O.—Molding fine	4.25
Molding coarse	3.75
Oregon, Ill.—Core, furnace lining, molding fine and coarse	2.50@3.50
Sand blast	3.50@5.00
Ottawa, Ill.—Crude silica sand	1.50@1.75
Ottawa, Ill.—Core, furnace lining, steel molding	3.00
Sand blast	5.00
Glass sand	3.00@3.00
Roofing sand	2.25
Ridgeway, Pa.—Glass sand, green	2.25
Glass sand, wash	2.50
Molding, fine and coarse	1.20
St. Peter, Minn.—Glass sand	2.25
Core sand	2.25
Brass molding	2.25
Molding fine	2.25
Rockwood, Mich.—Glass sand, core, roofing, stone sawing	3.50@4.00
Sand blast	3.50@4.00
Thayer, Pa.—Traction	2.25
Furnace lining	1.40
Molding fine and coarse	1.25@1.50
Core, steel	2.50@3.00
Tygarty, Ky.—Core and stone sawing	2.60
Fire-brick sand, washed but not dried	2.15@2.40
Utica, Pa.—Core	3.00
Molding fine	3.00
Molding coarse, traction	3.00
Brass molding	3.00
Warwick, Ohio—Core, furnace lining, molding fine and coarse (dry)	3.00
Same, green	2.50
Wedron, Ill.—Core (crude silica)	1.25
Molding fine	1.50
Furnace lining	1.50
West Albany, N. Y.—Molding fine	2.50
Molding coarse	2.50
Brass molding	2.50
Zanesville, Ohio—Molding fine and brass	2.50@3.00
Molding coarse	2.25@2.50

Crushed Gypsum

Castalia, O.—Crushed, to cement mills	4.50
Ft. Dodge, Ia.—Bulk	4.00
Grand Rapids, Mich.—Crushed gypsum rock	4.50
Gypsumville, Man., Can.—Crushed	3.50
Oakfield, N. Y.	4.00
Gypsum, O., and Akron, N. Y.	4.50@5.50

(Gypsum) Land Plaster

Castalia, O.—Land plaster	6.00
Bags extra—Jute, 3.00; ppr., 1.00.	
Garhutt, N. Y.—Land plaster, bags	8.00
Grand Rapids, Mich.—Ground gypsum rock	8.50
Mound House, Nev.—Ground gypsum rock	7.50@8.00
Sacks, .25 extra	
Oakfield, N. Y.—Ground Gypsum rock	8.00
Plasterco, Tex.	12.00
Sandusky, O.	6.00
Jute, 3.00 extra; ppr., 1.00 extra.	
Los Angeles, Calif.	12.40@14.40

Ground Rock Phosphate

Centerville, Tenn.—B. P. L., 70%; ton, 2000 lbs. (90% thru 100 mesh)	9.00@10.00
Lump rock, 72% to 75%, B. P. L.	6.00@8.50
Centerville, Tenn.—B. P. L., 65%	8.25
B. P. L., 70%	9.00@10.00
Brown rock, 75% and better	12.00
Gordonsburg, Tenn.—2000 lbs. (90% thru 100 mesh)—B. P. L., 60%	6.00
B. P. L., 65%	7.00@9.50
B. P. L., 70%	9.50
B. P. L., 72%	9.50
B. P. L., 75%	12.00
Lump rock, long ton, 70%	9.00
Mt. Pleasant, Tenn.—(B. P. L. 68%) 13% phosphorus	7.50@9.00
14% phosphorus	8.00
Mt. Pleasant, Tenn.—B. P. L., 70%	10.00
Norwills, Fla.—Fla. Hard Rock (B. P. L., 68%)	10.00
Wales, Tenn.—(B. P. L., 70%)	8.75

Florida Soft Phosphate

Bartow, Fla.—B. P. L., 60%, bulk	10.00
Croon, Fla.—Ground pebble, 30%	16.00
Pulverized soft, 26%	17.50
Jacksonville (Fla.) District	10.00@12.00
(Add 2.50 for sacks)	
Norwills, Fla.—B. P. L., 60%, bulk	10.00
Phoslime, Fla. (in burlap bags)	15.00

Portland Cement

Current warehouse prices, carload lots at principal cities, without bags:

New York (del.)	$4.10
Jersey City (del.)	3.55
Boston	3.32
Chicago	2.35
Pittsburgh	2.42
Cleveland	2.73
Detroit	2.71
Indianapolis	2.61
Toledo	2.71
Milwaukee	2.59
Duluth	2.35
Peoria	2.63
Cedar Rapids	2.71
Davenport	2.76
St. Louis	3.45
San Francisco	3.09
New Orleans	4.60
Minneapolis	3.30
Denver	3.25
Kansas City	2.76
Seattle	3.12
Dallas	3.85
Atlanta	3.75
Cincinnati	2.85
Los Angeles	3.10
Baltimore (del.)	4.59
Montreal (including bags)	3.00
Detroit	3.71

NOTE—Bag charge is generally 25c each.

Natural Cement

Current price for 500 bbl. or over, f.o.b., exclusive of bags:

	Current
Minneapolis (Rosendale)	$3.00
Kansas City (Ft. Scott)	1.60
New Orleans	3.36
Atlanta (Magnolia)	1.90
Cincinnati (Louisville)	2.85
Boston (Rosendale)	2.35

Roofing Slate

The following prices are per square (100 sq. ft.) for slate, f. o. b. cars, quarries, Bangor, Penn.

No. 1 Clear Slate

Sizes	Price
24x14	10.85
24x12	10.85
22x12	11.55
22x11	11.55
20x12	11.55
20x10	12.60
18x12	11.90
18x10	12.60
18x 9	12.60
16x12	11.90
16x10	12.60
16x 9	12.60
16x 8	12.60
14x10	11.90
14x 8	11.90
14x 7	11.20
12x10	11.20
12x 8	11.20
12x 7	11.20
12x 6	11.20
10x 8	9.10
10x 7	9.10
10x 6	9.10

No. 2 Clear

24x12	8.75
22x11	8.75
20x10	9.45
18x10	9.45
18x 9	9.45
16x 8	9.10
14x10	9.10
14x 8	9.10

No. 1 Odd Sizes

18x18	13.30
16x16	13.30
14x14	13.30
12x12	13.30

The following are the prices per square for slate, f.o.b. cars quarries, Granville, N. Y., the prices given in each case being for No. 1 Sea Green Roofing Slate:

22x11, 20x12, 20x11, 20x10, 18x12, 18x10, 18x9, 16x12, 16x10	11.90
16x12, 16x10	11.90
24x12, 22x12, 16x9, 16x8, 14x12, 14x10	11.55
26x14, 24x14, 22x14, 20x14	11.20
14x9, 14x8, 12x10	10.50
14x7, 12x9, 12x8	9.80
12x7, 11x8, 11x7, 10x8	9.10
12x6, 10x7	8.40

Granulated slate per net ton, f. o. b. quarries, Vermont and New York, 7.50@12.00.

Lime

Warehouse prices, carload lots at principal cities.

	Hydrate per Ton	
	Finished	Common
New York	$21.00	$20.00
Kansas City	27.20	26.20
Chicago	.....	.....
St. Louis	27.00	21.00
Boston	27.50	25.25
Dallas	.....	25.00
Cincinnati	17.20	16.20
San Francisco	25.40	22.00
Minneapolis	29.50	23.00
Denver	32.00	.....
Detroit	23.00	19.00
Seattle	30.00	.....
Los Angeles	2.75†	2.20†
Baltimore	23.50 (East)	.....
Montreal	25.00	25.00
Atlanta	.....	.....
New Orleans	24.50	24.50

	Lump per 200-lb. Barrel	
	Finished	Common
New York	$ 5.00 at plant	$ 5.50*
Kansas City	2.50	2.40
Chicago	.....	1.90
St. Louis	.....	2.75
Boston	3.70†	3.40†
Dallas	.....	2.50†
Cincinnati	.....	13.20‡
San Francisco	.....	2.25
Minneapolis	2.00	1.85
Denver	1.05 (bu.)	.....
Detroit	2.00†	1.80†
Seattle	2.85†	.....
Los Angeles	2.75†	2.00†
Baltimore	.....	13.00‡
Montreal	15.00‡	15.00‡
Atlanta	3.00†	2.75†
New Orleans	3.00	2.85

*300-lb. barrels. †Per 180-lb. barrel. ‡Per ton.
NOTE—Refund of 10c per barrel with 25c per ton off on hydrated.

Talc

Prices given are per ton f. o. b. (in carload lots only) producing plant, or nearest shipping point.

Baltimore, Md.—Crude talc	4.00
Cubes	60.00
Blanks, per lb.	.08
Henry, Va.—Crude talc (lump mine run), per 2000-lb. ton	3.50
Ground talc (20-50 mesh), bags	8.75
Ground talc (150-200 mesh), bags	13.50
Chatsworth, Ga.—Crude talc	8.00
Ground talc (150-200 mesh), bags	14.00
Pencils and steel workers' crayons, per gross	2.00
Rochester and East Granville, Vt.—Ground talc (20-50 mesh), bulk (Bags extra)	8.50@10.00
Ground talc (150-200 mesh), bulk (Bags extra)	10.00@22.00
Waterbury, Vt.—Ground talc (20-50 mesh), bulk (Bags extra)	8.50@10.00
Ground talc (150-200 mesh), bulk, 10@15.00 and (Bags extra)	10.00@20.00
Biltmore, N. C.—Ground talc (150-200 mesh), 200-lb. bags	15.00@30.00
Pencils and steel workers' crayons, per gross, 1.25@1.45 and	1.55@ 1.60
School crayons, per gross	1.15@ 1.20
Roller mill crayons, per gross	1.75@ 1.90
Keeler, Calif.—Ground talc (150-200 mesh), bags	18.00@40.00

Sand-Lime Brick

Prices given per 1,000 brick f. o. b. plant or nearest shipping point, unless otherwise noted.

Michigan City, Ind.	14.00@15.00
Milwaukee, Wis. (delivered at job)	18.50
South Dayton, Ohio	16.50
Albany, Ga.	16.00
Brighton, N. Y.	20.50
Buffalo, N. Y.	17.00
Winnipeg, Can. (less $1 trade disc.)	19.00
Boston, Mass.	21.00
Syracuse, N. Y.	24.70
Washington, D. C.	15.50
Portage, Wis.	25.00@30.00
San Antonio, Texas—Common	19.00@22.00
Face	30.00@35.00

In an early issue ROCK PRODUCTS will begin quoting prices of concrete brick.

Reparation for Overcharge for Switching Limestone

A FINDING OF UNREASONABLENESS and an award of reparation have been made in No. 10481, Rogers-Brown Iron Co. vs. Director-General, as agent, opinion No. 6425, 59 I. C. C. 186-90, as to charges on 2,110 carloads of limestone, moved between June 25, and November 8, 1918, between lake front docks and furnaces of the complainant, both within the city limits of Buffalo. After protest the charge was reduced to $5 per car on November 9. The charges were increased from $2.60 per car to an average of $13.34, or from $8.34 to $13.34 per car.

The work was done by the Pennsylvania. It defended the charges on the ground that the service was a line-haul matter, although the work was done by yard engines and crews. The increase was therefore one cent per 100 pounds, under that part of General Order No. 28 authorizing a one-cent increase on stone hauled on the main line. The charge for the service, however, was carried in a switching tariff, to which fact Commissioner Eastman, author of the report, called attention.

The Pennsylvania called attention to the fact that it had to provide empty self-cleaning hopper cars, just as if the traffic were to have been hauled from Buffalo to New York City, or sent to any other place that would have involved what would have to be a road haul. In answer to that the complainant showed that the Pennsylvania had employed in similar work in Buffalo about 200 hopper cars, so that the work of obtaining cars for the business of the complainant was not any more arduous than would have had to be done in switching around in the yards.

Commissioner Eastman said that $7.50 would have been a reasonable charge and reparation is to be made to the basis of that charge.—"Traffic World."

New Jersey Profits by Sand and Gravel

THE DEPARTMENT OF COMMERCE and Navigation of New Jersey has developed a new source of income which will bring to the State, it is estimated, a revenue of about $12,000 a year. The department today turned over to the State treasurer a check for $8,784.92, representing receipts from five companies dredging sand on the New Jersey side of the Delaware River below Trenton.

A law permitting excavations of sand and gravel from the river bed has been on the statute books for several years, but its provisions never have been taken advantage of by the state until recently, when a tax of 2 cents per cubic yard was imposed on all sand and gravel dredged.

General Market News

No Prospect of Drop in Building Material Prices

"LABOR WILL NOT go to its pre-war level, prices for materials will not be much reduced, and transportation charges will remain higher than before the war. With these facts established, building costs cannot be expected to reach a much lower level than the present for some time. There will be some reduction, of course, but it will not bring the price down to the pre-war figure."

This was the parting statement of Senator Calder, chairman of the Committee on Reconstruction and Production of the U. S. Senate, after a two-day hearing in Chicago. Various building material producers, by their testimony, convinced Senator Calder that there has been no profiteering in these commodities, and that such price increases as have occurred are accounted for by intermittent operation and part capacity production of the plants caused by transportation ills.

Contractors Disappointed

Under the heading, "Builders Brand Calder Hearing 'An Alibi Party,'" the Chicago Tribune of November 12 prints interviews with various unnamed "prominent builders," one of whom is quoted as follows:

"Every line has its association; everything is organized; that is, everything but the consuming public; competition is flatter than a pancake. Labor is pledging itself to do more work for a day's pay, and that cuts labor costs without chopping wages. But to start things moving it will also require a cut in cost of materials.

"Here's the idea. The Lord Almighty hasn't gone on strike, and hasn't been boosting prices—a clay pit, a gravel bank, a stone pile isn't worth any more than it was before the war—no more than sunshine and rain and the procession of the seasons, have advanced in value.

"Does a brickmaker's claypit cost him any more today than when he bought it before the war? No more than the coal vein in a mine costs the owner more than when he bought it. They don't have to pay more for the basic stuff.

"Labor, of course, has advanced, but a vast amount of the work in getting out raw material is done by machinery—stone crushers, steam shovels, etc.—and it's ridiculous to say production costs have increased anything like the increase in prices.

Need Education

The above quotation seems to convey the popular idea of a rock products operation. When contractors express such sentiments it is time they were educated in some of the first principles of business.

There is just one hope or chance of lower prices of basic building materials. This is that plants designed to produce a given tonnage be allowed by the railways to produce somewhere near that tonnage instead of 25 per cent of it, as they have this season.

Fire Destroys Plant of Wedron White Sand Co.

A FIRE LOSS estimated at $100,000 was suffered on November 6 by the Wedron White Sand Co., Wedron, near Ottawa, Ill. The silica sand plant of this company and nine box cars were completely destroyed.

The fire was discovered at 3:30 a. m. and is supposed to have been caused by an overheated bearing. There was no fire-fighting apparatus available and the entire plant was destroyed. It is expected the work of rebuilding will begin at once.

Chicken Grits

THE LIMESTONE REPORTED as sold for chicken grit in 1918 amounted to 5,432 short tons, valued at $13,651, and was from California, Illinois, Nevada, Ohio, and West Virginia. Marble, granite, and miscellaneous varieties of stone were also reported as sold for chicken grit, but the sales are not included here.

More Open Top Cars Released

ABOUT 25,000 open-top cars were added, on November 6, to the stock of that kind of equipment that may be used for traffic other than the hauling of coal. That increase in the number of open-top cars that may be used for transporting road and building materials was caused by the issuance by the Interstate Commerce Commission of an amendment to Service Order No. 20, effective at midnight, November 7.

That amendment changed the description of coal cars subject to the order confining coal cars to the carriage of coal, by limiting the description to cars being 42 or more inches in height. The commission's first description of a coal car was one having sides of 36 inches or more in height.

Another order on November 15 modified the preceding orders to the extent of exempting the territory west of the Mississippi River and so modifying the description of gondola cars as to allow practically all flat-bottom cars to be used for other materials than coal.

New California Gypsum Development

THE IMPERIAL GYPSUM AND OIL CO., San Diego, Calif., has been organized to develop a high grade gypsum deposit in the Imperial Valley. The company is capitalized for $500,000 and is incorporated under the laws of California.

The officers and directors of the company are: Theodore McLaughlin, president, capitalist, with 25 years' experience in the building industries; H. E. Rhoads, vice-president, former general manager of the San Diego Sun, Los Angeles Record and San Francisco News; Fred A. Heilbron, treasurer, city councilman of San Diego; Hal G. Hotchkiss of the Crescent Realty Co., secretary; W. H. Allen, director, 25 years' experience in the stone business, and Dr. W. R. Byars, director, 20 years' residence in San Diego, all of San Diego, and Samuel W. Dunaway, director, merchant and owner of the Dunaway Block at El Centro. W. J. Beman, well known in San Diego and the Imperial Valley for the last 10 years, is the general sales agent of the company.

There is estimated to be more than 25,000,000 tons of high grade gypsum in the company's deposit, analyzed by geologists and chemists to run from 95 per cent to 99 per cent pure. It is all above the ground and will eliminate underground mining. The deposit is located west of Westmorland, near Superstition Mountain.

It is said the demand for gypsum for portland cement and for plaster is so great that it is impossible to supply this demand at the present time. During the last month several of the larger manufacturers of wall board in Los Angeles were compelled to close down for a third of the month because they could not get gypsum plaster.

There also is a great demand for ground gypsum or land plaster for fertilizer, especially in Imperial Valley, where it is especially recommended for the soil there.

The company has opened offices at 250-251 Spreckels Building, San Diego, and is ready for business. President McLaughlin said recently that the company already is in receipt of numerous requests for raw gypsum, pulverized gypsum and plaster, and that actual development work will start soon.

A limited amount of stock will be offered the general public at par value of $1 per share, to become associated in the enterprise, which, it is thought, is destined to become one of the largest industrial enterprises in southern California. Temporary offices in Imperial Valley have been opened in the Dunaway Building, El Centro, with Samuel W. Dunaway in charge.

News of the Industry

Incorporations

Asbestos Mines, Ltd., Montreal, have been registered.

North American Feldspar, Ltd., Toronto, has been incorporated with a capital of $60,000.

Rosebank Lime Co., Victoria, B. C., has been registered by W. P. D. Pemberton and H. M. Lewis.

The Tennessee Stone Co., Chattanooga, Tenn., have increased their capital from $100,000 to $150,000

British Columbia Bauxite Co., Ltd., Vancouver, B. C., has been incorporated with a capital of $100,000.

The Clem Gravel Co., Dallas, Tex., has been incorporated for $300,000 by A. W. Clem, J. G. Strawn and E. H. Jones.

The Caledonia Sand Co., Racine, Wis., has been incorporated for $6,000 by J. C. Wemmert, P. J. Frederickson and C. A. Erickson.

The Alpha Portland Cement Co., of New Jersey has been incorporated in Michigan for $25,000; C. W. Moore of Detroit is the Michigan agent.

The Baldwin Lumber Co., West Allis, Wis., has been incorporated for $25,000 to deal in lime, cement, tile, brick and all other building materials.

The Empire Gypsum Co., Rochester, N. Y., has been incorporated for $405,000 by E. H. Hay, T. W. Curtis, and A. A. Wolf, all of Rochester.

The Teare Limestone Co., Cleveland, O., has been incorporated for $25,000 by C. W. Bailey, J. R. Crowel, W. P. Miller, T. R. Teare and W. B. Teare.

The Midway Products Co., has been organized in Jeffersonville, Ind., with a capital of $10,000 for the purpose of producing sand and gravel. The directors are John Gienger, C. V. Ollhands and H. W. Beecher.

The Patapsoe Feldspar Co. has been incorporated in Baltimore, Md., with headquarters at 4014 Main avenue, with a capital of $100,000, by Albert E. Droman, Sr., Gustav J. Kerdula and John Weetenkamp.

The Douglas Phosphate Co., Seattle, Wash., has filed articles of incorporation for $250,000 to acquire and deal in phosphate and its by-products. The incorporators are Fred Brores, J. S. Goldsmith and H. A. Kaufman.

The Nelson Grindstone Co., of Racine, Wis., has been incorporated for $50,000 to operate quarries, and deal in emery, lime, stone, sand, gravel and cement. The incorporators are I. T. Nelson, E. C. Nelson and L. D. Nelson.

The Capital Hill Quarry Co., Barre, Vt., has been incorporated for $250,000 to engage in the quarrying and general granite business. The incorporators are Ellis M. Treat, 1883 Main St., Buffalo; William T. Calder and Allan W. Reid, Barre; and John J. Knobloch, 1875 Main St., Buffalo, N. Y.

The Mid-West Construction Co., Minneapolis, Minn., has been incorporated for $50,000 for the purpose of operating quarries, lime kilns, cement and plaster mills, etc. The incorporators are Nels J. Blenhoff, Pres.; Wm. M. Anderson, Vice-Pres., and John B. Johnson, Sec'y-Treas., all of Minneapolis.

The Furr Construction Co. has been incorporated in Concord, N. C., with a capital of $10,000 and will put in a plant here to manufacture concrete septic tanks, with a capacity of 25 tanks a day. Machinery has been ordered. Walter L. Furr is Pres. and Treas., and D. M. Furr, Jr., is Secy. and Gen. Mgr.

The Sundale Silica Co., Sundale, Wash., has filed articles of incorporation. The incorporators are: Jas. H. Beeks, Gus Beeks, Dewey Beeks, Samuel Beeks and Ray Beeks, all of Sundale, and J. C. Wright of Goldendale. Mining and shipping silica on a large scale is the purpose of the new company who are beginning operations at once. Silica, a comparatively new discovery, has been located in large quantities about five miles north of Sundale Station. It is pure white in color, has a high resistance to heat and cold, is used for refrigeration, paints, filtering plants, soaps, automobile tires, jewelry and furniture polishing and in many other ways. The Sundale deposit is said to be of high quality with a ready market awaiting it.

The Maryland Flint & Feldspar Co. has been incorporated in Belair, Md., with a capital of $500,000, by Edw. G. Bucklin, Paul B. McFarland and Lawrence C. Gray.

The Vernga Marble Co., San Diego, Calif., has taken out incorporation papers fixing the capitalization of the new organization at $500,000. San Diego is named as the principal place of business and the leasehold is for a period of 50 years. The directors named for the first year are Walter C. Harlow, Coronado; Frank G. Webb, East San Diego, and Fred W. Nash, Point Loma.

Sand and Gravel

The Cream City Sand Co., 601-607 Edison St., Milwaukee, Wis., dealers in sand, have filed articles of dissolution of the corporation.

The Big Bend Gravel Co., 204 Grand Ave., Milwaukee, Wis., have increased their capitalization from $10,000 to $35,000. Geo. Brew is president.

The Warsaw Sand and Gravel Co., Warsaw, Ind., has entered into a contract with the Indiana State Highway Commission to supply gravel to be used on state roads. A priority order will be issued to the Pennsylvania railroad to set gravel cars at the Winona pit.

The Chestnut Hill Sand and Coal Co., Wheeling, W. Va., have sold their property to Pittsburgh mining interests for $40,000. The property consists of 165 acres of land at Round Bottom, with the underlying coal. There are still several acres of unmined sand of a very good quality. The tract was acquired several years ago by the Chestnut Hill Sand & Coal Co., and was more recently operated under lease, by the Crystal Sand Co.

The Ohio Gravel Ballast Co., 2103-06 Union Central Bldg., Cincinnati, O., has taken over the following plants formerly owned and operated by the Miami Stone & Gravel Co., at Miami Grove, O.; The Cin'ti Crushed Stone & Gravel Co., at Miamiville, O.; The Ohio Ballast Co., at Gravel Pit. O.; The Trenton Sand & Gravel Co., at Trenton, O.; The Greenville Gravel Co., at Cleves, O., all of which have been consolidated and will be operated by a new corporation known as The Ohio Gravel Ballast Co., with offices as stated above. Harry Donnelly is Vice-Pres. and Gen. Mgr.

Quarries

Jas. B. Russel, of Winchester, Va., representing New York interests, has procured an option on 400 acres of limestone land in Cedar, Va. It is planned to build a $300,000 plant on the property to quarry and crush the limestone.

The H. W. Johns Manville Co., New York City, a national building-material manufacturing concern, has purchased the Wilson and Supplee farms at Plymouth Meeting, Penn., adjoining the Cox Lime & Stone Co. plant, and has already started stripping operations in the development of a large limestone quarry.

The Grove City Limestone Co., Grove City and Sharon, Penn., whose quarry is on the Hilliard branch of the Bessemer and Lake Erie R. R., is about to begin extensive improvements. In addition to building a number of new houses for their employes at the plant, the company expects to install a powerful pulverizer of the latest design and workmanship, with a capacity of ten to fifteen cars per day for the manufacture of agricultural limestone alone. With the addition of drying sheds, locomotives and other improvements the company will have one of the most up-to-date and modern equipped plants in the state with a capacity of approximately 120 tons of flux stone, road and agricultural limestone per day. The company owns over 400 acres of land and the limestone deposit is from 13 to 22 ft. in thickness and contains according to a competent engineer's estimate over twenty-four million tons of limestone. The grade of lime as shown by the Shenango Furnace Company, of Sharpsville, by their analysis, the deposit contains a rare exceptionally high grade quality of lime. Development work on the company's holdings have been going forward at a rapid rate for the past year and over 250,000 tons of lime rock is now stripped and ready for the loading, besides the blasting of a main entry into the solid lime rock for several hundred feet. This company has a $400,000 capital.

The Conshohocken Stone Quarry, Philadelpha, Pa., producer of the Conshohocken Building stone, has been closed and the property will be used for manufacturing sites. It was opened many years ago by Boyd, Stinson & O'Brien. At times as many as 200 men were employed here, great quantities of stone being supplied to railroads and cities of the East. Many early skyscrapers were built of Conshohocken stone and thousands of tons were used in harbor and bridge work.

The Holt & Gregg Co., Kennett, Calif., has sold its lime quarry, lime works, electric railroad and all its property in Kennett to the United States Smelting, Mining and Refining Co., owner of the **Mammoth Mine and Smelter. J. N. Gregg**, president of the company and one of its founders, confirms the report. The Holt & Gregg Co. commenced operations here in 1884, and ever since it has been the sole manufacturer of lime in this part of the State. Its lime quarry contains an inexhaustible supply of lime rock, which is much sought by smelters for fluxing purposes. Thousands of tons of lime rock have been shipped from here to the smelters at Keswick and Coram, saying nothing of the thousands of tons that have been used a tthe Kennett smelter or shipped to the sugar factory at Hamilton several years ago. In the deal go the electric railroad and all its equipment and the numerous buildings owned by the Holt & Gregg Co. in Kennett.

Phosphate

The American Humus & Phosphate Co., of Dundee, Fla., has been enlarging its plant.

The American Agricultural-Chemical Corp., has leased from C. D. Loveless of Maury, Tenn., his farm containing 334 acres of phosphate rock for the consideration of $150,000; $50,000 cash and the balance in royalties of $1 per ton at the rate of $25,000 a year for 4 years. The land is located in the phosphate belt of Maury county and is said to be the highest grade phosphate in that section.

The Emporia Potassium Phosphate Co., Emporia, Va., capitalized for $500,000, will establish a plant with a daily capacity of 150 tons of complete commercial fertilizer manufactured from feldspar, potash and phosphate rock. This corporation, general plans recently announced, has organized with the following officers: A. L. Kreiss, president and manager; R. F. Graves, vice-president; A. F. Dodd, secretary; G. L. Vincent treasurer. It has 800x65 and 100x100-foot brick buildings, which will be utilized for the manufacturing plant, and the fertilizer machinery will include dryers, pulverizers, mixers, sackers, etc. Carneal & Johnston of Richmond, are the architects and construction engineers for the plant.

Cement

The Dominion Iron & Steel Co. are now turning out cement at their new plant and it is the intention of the management to augment the present output until it reaches a capacity of 75 barrels per day.

The Bamberton Cement Works, Vancouver Island, B. C., are to be re-opened about the first of Jan., 1921, by the British Columbia Cement Co. The machinery and equipment are now being overhauled.

The Carney Cement Co. is to build a plant north of Mankato, Minn. Plans are being made for 16 steel kilns, 60 ft. high and 18 ft. in diameter, mill building, machine shops, blacksmith shop, garage, sack warehouse, chemist building and concrete coal hoppers.

Ontario, Can.—While cement plants are lying idle owing to fuel shortage, Ontario is supering from a shortage of cement. Hon. F. C. Briggs, Minister of Highways, stated that roadwork is being held up, because cement cannot be secured. At Belleville No. 4 plant of the Canada Cement Co. is closed down due to shortage of coal and electric power. Plant No. 5 at Belleville is running on part capacity. The plant No. 8 at Port Colborne is running part time and the plants at Montreal are handicapped by fuel shortage.

Charles Page and others, of Sand Springs, Okla., are putting in a rock crusher at Bruner Station, and plan to manufacture cement.

E. B. Moore, Box 740, Abilene, Tex., and others, propose the erection of a cement plant at that place of 100 to 200 bbl. daily capacity, and want prices on plants.

The Lehigh Portland Cement Co., is working its mills at Chapman's and West Coplay, Pa., on a day and night basis, in order to meet the heavy demand for cement. The company's stockhouses are empty.

Lakefield, Ont.—A by-law has been passed by the Lakefield, Ont., ratepayers granting concessions to the Canada Cement Co. It is stated that the Lakefield plant will be the second largest in Canada. The company will proceed with construction work, and it is expected that production will be commenced in time to relieve the shortage during next year.

Concrete Products

Keremeos, B. C.—A cement brick and block plant has been opened at Keremeos, B. C., by J. Knudson.

The Richland Shale Products Co., of Columbia, S. C., has increased its capital stock from $75,000 to $100,000.

The Concrete Products Co., of Cedar Rapids, Ia., of which J. H. Irey is president, has let the contract for a factory building to cost $60,000.

The Dakota Concrete Stone Co., will build a factory in Sioux Falls, S. D., at 918 N. Weber avenue, for the manufacture of road culverts and drain tile.

The Stucco Sales Co. has been incorporated in Highland Park, Mich., with a capital of $25,000, to deal in all kinds of brick, stone, cement and building material.

The Super-Concrete Mold Co. has been incorporated in Baltimore, Md., with a capital stock of $40,000, by John W. Smith, Wm. D. Ham and others, and can be reached at 1601 Lexington Bldg.

The American Stucco Manufacturing Co. of Barberton, Ohio, has been chartered with a capital of $50,000 to manufacture stucco and applied to put it on buildings. The incorporators are H. J. Porter, C. Sickler, J. N. Patton, T. J. Adamson and J. H. McClelland.

Richmond Cement Products & Machinery Co., Richmond, Va., has been incorporated for $100,000 to manufacture and deal in cement, cement products, lime, limestone, plaster, etc. The incorporators are, Joseph Vogt, Pres., John Willenbring, Vice-Pres., and Wm. Moening, Sec'y-Treas., all of Richmond.

The Zanesville Cement Products Co., Zanesville, O., has been incorporated with a capital of $120,000 to manufacture all kinds of cement products. The incorporators are S. A. Anderson, R. W. Mercer, E. F. Keener, C. E. Mercer and W. S. Jacobs. Under the charter the company is authorized to buy and sell building supplies of all kinds.

Retail Dealers

Mineral Point Lumber Co., Mineral Point, Wis., dealers in all building materials, have increased their capitalization from $20,000 to $50,000. C. M. Peaslee, of Dubuque, Ia., is president.

The Silver Lane Sand Co., East Hartford, Conn., has been organized to deal in sand, gravel, and kindred products by H. L. Kenney, East Hartford, and Samuel Lutin, 32 Pliney St., Hartford.

The Island Supply Co., Jamaica, L. I., has been formed with a capital of $20,000 to operate a local building supply business. The company is headed by R. W. Morrison, A. E. Martin and E. J. Sidley.

The Color-Stone Stucco Co., Wilmington, Del., has been incorporated for $30,000 to manufacture cement, stucco and similar supplies. The incorporators are C. B. Outten, C. T. Cohee and S. L. Mackey.

Long Island Cement Products Co., Jamaica, L. I., has been formed with a capital of $10,000 to deal in cement, cement block and other building materials. The company is headed by T. Gerue, C. E. and J. S. Linehan.

Donaldson & Hewes, Long Island City, N. Y., have formed a partnership with a capital of $20,000 to deal in mason supplies and other building materials. F. L. Hewes, R. T. Donaldson, Freeport, L. I., and D. P. McCall, Long Island City, head the company.

The Townley Building Material & Coal Co., Newark, N. J., has been organized with a capital of $25,000 to deal in a complete line of mason materials and other building supplies. The company is headed by F. C. Townley, C. L. Young and M. L. Macmillan.

The H. J. Martin Co., dealers in mantels, tiling, etc., in Detroit, Mich., has changed its name to the Martin-Gibson Co.

The Morse Granite Co., of Kenosha, Wis., has let the contract for a 1½ story workshop, 50x46, of brick, and to cost about $20,000.

Lane Lumber Co., Darlington, Wis., dealers in stone, lime, cement and other building materials have increased their capitalization from $20,000 to $50,000.

The W. P. Wigley Co., Racine, Wis., have increased their capitalization from $60,000 to $100,000. They deal in lime, cement, and other building materials.

The Commercial Supply Co., Coal City, Ind., has filed articles of incorporation with a capital of $10,000. The directors are Frank Price, W. M. Free and Herbert Reagan.

The Wetzel Supply Co., New Martinsville, W. Va., has been incorporated for $50,000 to manufacture and sell concrete building blocks The incorporators are N. N. Oblingerm, Joseph Smith, W. E. Wharton, C. L. Smith, W. H. Smith, S. E. Harmon and T. W. Burlingame.

Personals

A. W. G. Clark was recently appointed general manager of the Edmonton Cement Co., Ltd., of Edmonton, Alta.

W. H. McClennan, Springfield, Ohio, has sold his interest in the Springfield Cement Products Co. to his former partner, Clem Beals.

Geoff. A. Sager resigned as chemist for the Lehigh Portland Cement Co., Newcastle, Pa., to become chief chemist for the Bessemer Limestone and Cement Co., Bessemer, Pa.

W. F. Cummins, geologist for the Southern Pacific R. R. for over 25 years, was in Alpine, Tex., recently. Mr. Cummins was in this section looking for a location where his company could put a rock crusher, and made a favorable report that the plant could be put in at Toronto, five miles west of Alpine. A crew is working there now making tests.

Horace Bowker has been elected vice-president in charge of sales of the American Agricultural Chemical Company, New York City. Mr. Bowker needs no introduction to the trade, having been secretary of the company for twelve years and a member of the executive committee for several years. He has been identified with the fertilizer industry for 21 years, having started to learn the business in the old Bowker factory in Cincinnati in 1899, where his first duty was the moving of materials in a wheelbarrow. He is familiar with all branches of the fertilizer industry and is amply qualified to handle the added responsibilities of the office of vice-president.

R. A. Bull of Pittsburgh, Pa., has been appointed consulting metallurgist for a number of prominent steel foundries grouped for the purpose of developing and perfecting higher standards in the production of steel castings. Mr. Bull will devote his entire time to preliminary research work immediately and has resigned his position as vice-president of the Duquesne Steel Foundry Co. The members of the group are among the best known steel foundries in the country and include: Electric Steel Company, Chicago, Illinois; Fort Pitt Steel Castings Company, McKeesport, Pa.; Isaac G. Johnson Company, Spuyten Duyvel, N. Y.; Lebanon Steel Foundry Company, Lebanon, Pa.; Michigan Steel Castings Company, Detroit, Mich.; Sivyer Steel Castings Company, Milwaukee, Wis. Mr. Bull is widely known in the steel castings industry as an authority in metallurgy and foundry practices, is a member of numerous technical associations and has frequently contributed to the technical press. Since 1911 he has been a director of the American Foundrymen's Association and during 1916 and 1917 served two terms as its president. His connection with the foundry industry covers a period of over twenty years during which he has held important positions in foundries at St. Louis, Chicago, New York and Pittsburgh.

OBITUARY

Adam Bremner, aged 64 years, died at Woodstock, Ont., on October 16. He was born in Oxford county and was well known throughout Western Ontario. He was engaged in the lime business.

J. H. Speer, whose death is reported in Oakland, Calif., was founder of the Washington Brick, Lime & Sewer Pipe Co., in Spokane, Wash., and had for 33 years been a resident of that city.

R. L. Hatfield, McAlester, Okla., president of the Stringtown Crushed Rock Co., was killed by an accident at his plant on July 29. A car of machinery was being unloaded under his direction when a heavy timber fell on his head, crushing his skull. Mr. Hatfield was formerly a railroad man, having been roadmaster of the Missouri, Kansas & Texas Ry. for 16 years.

Elisha S. Williams, vice-president of the United States Rubber Co., died on Oct. 8, 1920. Mr. Williams, whose death was a great shock and profound sorrow to all who knew him, was born in Malden, Mass., in 1873, and was educated in the Malden public schools, taking a business course in the Malden high school. He then entered the employ of the Revere Rubber Co., and in the course of a few years became the New England manager, a little later the Chicago manager, and in a year or two was promoted to the position of general sales agent, which, in turn led to his assuming the chief executive position in that company as treasurer and later president. When the Revere Rubber Co. was taken over by the United States Rubber Co., largely to secure Mr. Williams' services, he was elected president of the Rubber Goods Mfg. Co. which at that time controlled all the mechanical business of the U. S. Rubber System. Mr. Williams then consolidated all of the company's subsidiaries by forming the U. S. Tire Co. In 1915 he was elected vice-president of the United States Rubber Co., in charge of the mechanical goods business. He was also a director of the United States Rubber Co., a member of the operating council, and president of several subsidiary companies.

Manufacturers

The F. Hurlbut Co., Green Bay, Wis., dealers in sand, lime, cement and all building materials, have increased their capitalization from $100,000 to $600,000.

The C. C. Buchanan Co., Inc., manufacturers of the Buchanan jaw crushers and crushing rolls, has established an English agency with Robert Broadbent & Son, Ltd., Staleybridge, England. This English firm also manufactures a line of jaw crushers, but not in large sizes.

The Sanderson-Cyclone Drill Co., of Orrville, O., announces the appointment of W. L. Nothacker as vice-president, in charge of their Eastern and export office, New York City, and the removal of that office to the Hudson Terminal Bldgs., 30 Church St., Room 436, telephone Courtland 7333.

The John F. Byers Machine Co., Ravenna, O., held its third annual sales conference and convention at Glen Crest Hotel, Oct. 11 and 12, with all representatives in attendance, except Los Angeles and San Francisco. Pertinent matters of interest were discussed and plans for 1921 outlined. This company has under construction at the present time a new erecting shop, which when completed, will allow the increased production which is needed for the manufacture of their auto-crane in quantities to meet the demands for this machine.

The Link-Belt Co., 910 S. Michigan Avenue, Chicago, Ill., recently published an illustrated and very attractive 24-page book covering their Traveling Water Screens. This publication will be sent to anyone interested in the effective and economical screening of condensing water. Surface condensers are easily clogged up by trash contained in the water supply, and very hard to clean. Clogged condenser tubes mean reduced efficiency of operation and other disadvantages that can be forestalled by the use of traveling screens. This interesting subject is covered fully.

The Webster Mfg. Co., 4500-4560 Cortland St., Chicago, Ill., have issued the October, 1920, number of "Webster Method," containing articles on recent interesting installations in the material handling field. "Webster Method" is one of the leading house organs in the machinery trade, having been issued since 1911. Its interesting numbers contain description and photographs of recent installations in the coal, grain, mining, chemical, and other fields, in which conveying apparatus form so large a factor in conserving hand labor. The subjects of its articles cover not only installations which solve labor handling problems in the United States but often include installations which have been made in foreign countries. "Webster Method" is published regularly and distributed free to those who are interested in labor conserving methods.

Electric Hoists.—The revised edition of catalog No. 380 is now off the press and available for distribution. This 96-page book covers the Link-Belt line of standardized monorail electric hoists as well as overhead electric traveling cranes in capacities of one-half to three tons inclusive. It completely describes these machines giving tables of weights, clearance dimensions and speeds, and is copiously illustrated. The numerous photographs of machines in operation indicate that foundries, machine shops and factories of every description are fast coming to a greater realization of the need for installing labor-saving, cost-reducing, production-increasing equipment of this character. Every architect, consulting engineer, railroad master mechanic, foundry superintendent and factory manager or engineer will be interested in this useful book. Copies can be had by addressing Link-Belt Company, 910 S. Michigan Ave., Chicago, Ill., or any branch office of the company.

USED EQUIPMENT

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Repaired Contractors' Equipment

Steam Shovels

Model 60 Marion Shovels, 2½-yard dippers, Nos. 1999, 2059, 2130

1—Model 1 Thew, on railroad trucks, ⅞-yard dipper.

1—Bucyrus Model 70-C, Shop No. 1219.

We have a large stock of thoroughly repaired Construction Equipment of all kinds ready for immediate shipment.

Locomotives

8—18-ton, 10x16" Porter Dinkeys, 36" gauge.
2—12-ton, 9x14" Porter Dinkeys, 36" gauge.
1—17x24", 55-ton, 4-6-0, standard gauge.
3—25-ton Forney type.

Clam Shell Buckets

1—1¼-yard Williams Hercules Bucket.

Cars

30—Western Air Dump 12-yard, standard gauge.
40—Western 4-yard, 36" gauge, steel beam.

H. KLEINHANS COMPANY
Union Arcade **Pittsburgh, Pa.**

FOR SALE

3—8x110-ft. Rotary Kilns.
2—6x60-ft. Dryers.
5—5½x22-ft. Tube Mills.
2—No. 4 Williams Mills.
1—No. 2 Williams Mill.
Steel Buildings.

ENGINEERING SALES CO.
Nashville, Tenn.

FOR SALE

2—No. 18 Gates K Gyratory Crushers with elevators and screen; complete; first class; immediate delivery. Also twenty other sizes.

J. F. DONAHOO CO.
Birmingham, Ala.

Shovels, Locomotives, Cars and Cranes

Bucyrus, 40-ton, 1½ yard.
Bucyrus, 70-ton, 2½ yard.
Osgood Model 18, Traction, ¾ yard.
Marion Model 28, Traction, ⅞ yard.
Thew Model O, Traction, ¾ yard.

LOCOMOTIVES

American, 30-ton Std. Gauge Saddle Tank.
Baldwin, 35-ton Std. Gauge Saddle Tank.

CARS

10 Western 12-yd. Std. Gauge.
48 Kopple 1½-yd. 24 Gauge, Illinois Delivery.

LOCOMOTIVE CRANES

Osgood Model 29, Std. Gauge.

Clam Shell, Orange Peel, and Drag Line Buckets

Blaw Knox, one and two yds. Cap. Clam Shells.
Owen, 1¾ yds. Cap. Clam Shells.
Williams, 2 yds. Cap. Clam Shells.
Smith, ¾ yd. Cap. Orange Peel.
Hayward, 1 yd. Cap. Drag Line.
Page, 1 yd. Cap. Drag Line.
Some of the above items are new.

A. J. O'NEILL CO.
Weightman Bldg. Philadelphia, Pa.

Machinery For Sale

DRYERS—Direct-heat rotary dryers 3x25 ft., 3½x25 ft., 4x30 ft., 5½x50 ft., 6x50 ft., and 7x60 ft., double shell dryers 4x20 ft., 5x30 ft., and 6x35 ft., steam-heated air rotary dryers 4x30 ft. and 6x30 ft.

KILNS—Rotary kilns 8x110 ft., 6x60 ft., 3½x25 ft., and 3x25 ft.

MILLS—8x8 ft., 6x5 ft., 2½x3 ft., 3x3½ ft., pebble mills; 8x8 ft., 6x6 ft., 5x4 ft., 4½x3½ ft., 2½x2¾ ft. ball mills; 3 ft. Marcy mill; 42 in. 32 in., and 24 in. Fuller-Lehigh mills; 4½x20 ft., 5x11 ft., 5x22 ft., and 6x20 ft., tube mills; 7½x13 in., 9x15 in., 16x10 in., 20x6 in., and 30x60 in., jaw crushers; one "Infant" No. 00, No. 0, No. 2, No. 3, and No. 9 Williams' swing hammer mills; one Kent type "G" mill; 36 in. and 40 in. cage mills; 3 ft. and 4½ ft. Hardinge mills; 18x12 in., 20x12 in. and 30x10 in. roll crushers; No. 0, No. 1 and No. 3 Sturtevant rotary crushers; one No. 2 Sturtevant ring roll crusher; 3 roll and No. 000 and No. 00 Raymond mills; one No. 5 Telsmith breaker; one 36 in. Sturtevant emery mill; four Giant Griffin mills; one Junior Griffin mill; one 51x14 in. chaser mill.

SPECIALS—Five automatic package weighing machines; jigs; one keystone excavator; 6x8 ft., 6x5 ft., and 4x3 ft. Newaygo vibrating screens, Richardson automatic scales.

Air compressors and tanks.

W. P. HEINEKEN, Engineer
95 Liberty Street, New York Tel. Cortl. 1841

USED EQUIPMENT

Rates for advertising in the Used Equipment Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

FOR SALE

CRUSHERS

Two No. 6 and two No. 7½ McCully Gyratory Crushers

All four machines in good condition. Manganese fitted. Several extra parts included in sale. Can now be seen in active operation crushing hard trap rock.

STEAM SHOVEL

No. 90 Marion on Standard Gauge Railroad Trucks

30-ft. boom, 20-ft. dipper handle. Bucket 4 ft. 3 in. by 3 ft. 8 in. by 4 ft. Good condition. Immediate delivery.

PUMP

Blake & Knowles Suction Pump

10-in. suction, 8-in. discharge. Capacity about 450 gal. per min. This pump has had very little use, and is practically as good as new.

HOISTING ENGINES

One Lambert double drum hoisting engine, 6½-in. bore, 11-in. stroke.
One Flory double drum hoisting engine, 5-in. bore, 9-in. stroke.

SCREEN PLATES

24 Manganese Plates

These make six complete sections of 60-in. diameter circular screen, each section 30 in. long. 3-in. perforations. ¾ in. thick. New—never used.

DRILL STEEL

269 feet of ⅞-in. Hollow Hexagon Drill Steel
Lengths from 14 ft. 1 in. to 18 ft. 9 in.

ROPE

820 ft. of 2-in. graphite laid Manila transmission rope
Made by Wall Rope Company.
New—never used.

Birdsboro Stone Company
1004 Land Title Bldg., Philadelphia, Pa.

FOR SALE

Sand and Gravel Pumping Outfit complete, consisting of 10-inch Morris Pump, direct connected to 9x9-inch Double Engines; 125 H.P. Boiler; Dake one drum Hoist. All first-class condition. Price right. Immediate shipment. Have installed electric outfit.

The Lincoln Sand & Gravel Co.
Lincoln, Illinois

FUEL OIL ENGINES

2—MEITZ AND WEISS INTERNAL COMBUSTION
Engines, one 80-H.P., one 100-H.P. Complete. First class condition.

ROCK CRUSHERS

1—No. 2½ Climax.
1—24x15 FARRELL Type "B." Used three months, with Elevator, Screens, Bins, Engine, etc.

A. J. O'NEILL CO.
1524 Chestnut Street **Philadelphia, Pa.**

FOR SALE

Brand New Corrugated Manganese Steel Mantle for No. 8 "K" Type Allis Chalmers Crusher

This mantle sells at $997—
Our price $550

This mantle is of the "gunlock" type, standard size, corrugated, and was purchased for a crusher that was later wrecked. The mantle has never been used. Write

WEST SIOUX FALLS STONE CO.
Sioux Falls, S. D.

EQUIPMENT

Steam Shovels

2—5/4-yd. Thew "O" Traction, Mass. boiler.
1—No. 3 Thew 1-yd. dipper, R. R. type.

Locomotives

1—3-ton Std. gauge Plymouth Gasoline.
4—14-ton 36-in. gauge Vulcan saddle tanks.
2—14-ton 36-in. gauge Porter saddle tanks.
2—18-ton 36-in. gauge Davenport saddle tanks.
1—21-ton 36-in. gauge American saddle tank.

Dump Cars

9—24-in. gauge 1¼-yd. Western, 2-way.
35—24-in. gauge 1-yd. Koppel, 1-way.
8—30-in. gauge 1½-yd. all steel quarry end dump.
6—36-in. gauge Koppel 3-yd. V-shape, 2-way.
15—36-in. gauge 4-yd. Western, 2-way.
6—Std. gauge 30-ft. steel underframe side dump ballast.

ZELNICKER IN ST. LOUIS

Get our new big bulletin 285 for unusual bargains in Railway, Power Plant and Contractors' Equipment, Dump Cars, Track Accessories, Tanks, Pipe, etc.

Private Equipment for Sale or Rent

Byers Auto Crane, ¾ yd. clam shell.
Thew revolving shovel ⅝ yd.
8,000 ft. 24-in. gauge 20-lb. track.
Whitcomb gasoline locomotive 24-in. gauge, 3½ ton.
50 Koppel V-shape steel dump cars, 1¼ yd.
Derrick Car, standard gauge.
Sturdevant rolls, 20x14-in.
No. 5 Austin crusher, rear drive.
Keystone excavator, No. 3.
Jaw crusher, 9x16.
Bucyrus shovel, 65-ton, 2½ yd., mounted on railroad trucks (bargain).
35-ton locomotive, 16x24.
40-ton Climax, 12x14, geared locomotive, std. gauge.
7,000 ft. 2-in. black pipe.
Holt caterpillar tractor, 45 H.P.
3 steel trailers, 5 yd.
⅝ yd. Hayward orange peel bucket.
2 derricks (guy and stiff leg).
Porter locomotive 36-in. gauge, 6-wheel, 23-ton.
I own the above, will sell, or rent to responsible party.

Daniel B. Straley, Crown Point, Ind.

IMMEDIATE DELIVERY

2—150 H.P. 125 lbs. HRT. Boilers, Butt strap.
4—No. 6 Gates (Man. Fit.) nickel steel shafts.
1—No. 7½ and 1 No. 8 Gates, Reg. drive.
No. 4 Telsmith plant, AC. motor drive.
Air Compressors (Steam, Belt), 50 to 4000 ft.
40 Boilers, 60-150 HP. 100-130 lbs.
75 H.P. LOCO. BOILER, 125 LBS.
4 NEW No. 4 Gates, Mang. Fit. $2000 each.
35 H.P. and 112 H.P. Elec. Hoist, A.C. "NEW."
3 Bag Koehring paver, practically new.
1½-yd. Nagley Slack lined bucket equip.
9 K Crusher, Regular drive.
Type "O" ¾-yd. Thew steam shovel.
50—25-20-15 and 125 Kw. eng. and turbo sets.
1—42"x16" Traylor Roll Crusher.
2—156 Kva. 240 v. 60 cy. 3 ph. eng. sets.
Send us your inquiries. Pumps, steam and elec. equip., etc.

ROSS POWER EQUIP. CO.
INDIANAPOLIS, IND.

NO. 7½ AUSTIN GYRATORY CRUSHER

Standard Drive

Complete with elevator and revolving screens. Condition excellent. Also

No. 5 Austin, standard drive, with 30-ft. elevator. Condition excellent.

Both plants thoroughly rebuilt, and can be shipped promptly. We also have many other bargains. Write us fully.

Reading Engineering Co., Inc.
1227 Tribune Bldg. **New York, N. Y.**

9 K CRUSHER

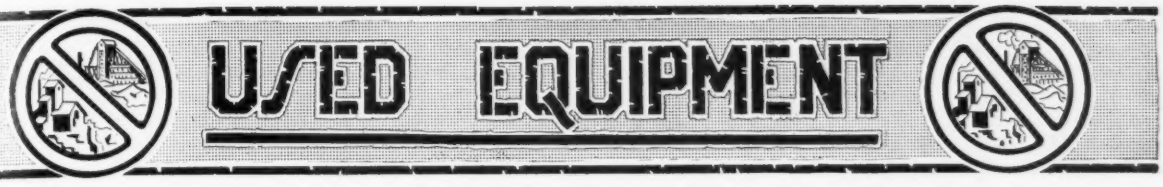
Regular Drive—Extra Fine Condition

35 H.P. and 112 H.P., A. C., Elec. Hoist NEW.
12 Steel Cars, 42-in. gauge, 7-yd. End Dump.

ROSS POWER EQUIP. CO.
INDIANAPOLIS, IND.

Idle Machinery Absorbs Profits

This department is the medium for the men who keep the wheels going. Sell your idle machinery to the man who'll keep it going.



WANTED

One Clyde Hydrater complete and guaranteed in number one condition. Address

Leesburg Lime Company
Leesburg, Virginia

MOTOR

1—300 H.P. GENERAL ELECTRIC 3-phase, 25-cycle, 440-volt, 500 R.P.M. Slip Ring Type. Brand new.

Send for Our Motor List

Mid-Continent Equipment & Machinery Co.
Security Bldg., St. Louis, Mo.

New—RAILS—Relaying

All sections on hand for quick shipment. Reasonable prices quoted. Our stock is very complete.

M. K. FRANK
Frick Building **Pittsburgh, Pa.**

CLASSIFIED ADVERTISING

Rates for advertising in the Classified Department: $2.50 per column inch per insertion. Minimum charge, $2.50. Please send check with your order. These ads must be paid in advance of insertion.

Plants for Sale

For Sale, Lease or Rent

A modern equipped limestone and pulverizing plant with 30 acres of a 30-ft. ledge of the highest testing blue limestone in southern Ohio. No lack of business, but am retiring on account of my health and age, but will take interest with party that can manage it if necessary. Plant has been in operation five years. Call on or address

FRANK SHARP, Lynchburg, Ohio

FOR SALE

1—Complete sand producing plant, including 300 acres of high grade sand rock producing 99.6% silica sand. Land is underlaid with thin seam of high grade coal. Can be purchased at a very reasonable figure, and should make an attractive proposition to anyone experienced in the operation of a plant of this kind. Address

J. C. EVANS
Fairmont, West Virginia

FOR SALE

Complete Ground Limestone Crushing Plant with Sturtevant Mill, Screens, Conveyors, etc.

EMPIRE LIMESTONE CO.
BUFFALO, N. Y.

FOR SALE

Sand and Gravel Plant. All machinery in first-class condition; plant can be seen in operation. Address,

Box 1444 **Care Rock Products**

Plants for Sale

FOR SALE

Silica Sand Crushing Plant, completely equipped, capacity 300 tons per day, 55 ft. Ledge white and buff silica sandstone. This plant is in first-class condition, has been in operation 10 years. Completed a new and up-to-date plant about a year ago. Have orders for entire output of plant, has operated winter and summer for past 10 years; best quality steel moulding sand; situated in Ohio; is a money-maker, and if sold quick will be sold at a bargain to someone interested in silica sand. Address

Box 1442 **Care Rock Products**

Situations Wanted

CRUSHING ENGINEER

wishes to communicate with operators having crushers not suited to their quarry formation and would be willing to make small investment to overcome the blocking of crushers with oversize stone. Address

Box 1447 **Care of Rock Products**

POSITION WANTED

as superintendent in construction and operation of sand and gravel plant. Have had 20 years' experience. Also broad experience in long distance pumping and constructing pumping plants. Hold a pilot license on the Mississippi River. First class references will be furnished. Age 40 years. Address

Box 1446 **Care of Rock Products**

Help Wanted

WANTED

Experienced Kiln Burners. Kilns 8x100 ft. and firing with fuel oil, 8-hour shift, dry process, pay satisfactory. Communicate with

Riverside Portland Cement Co.
Riverside, California

WANTED

Engineer capable of handling small Ingersoll Rock Chanelling machine. Wire

Siems, Helmers & Schaffner,
514 Guardian Life Bldg. **St. Paul, Minnesota**

WANTED

Millwright and working foreman for Sand Plant. Steam shovel, boilers, engines, crushing and washing machinery experience. Address

Box 1443 **Care Rock Products**

WANTED

Field Engineer, between 30 and 40 years old; familiar with cement and plaster mill conveyor installations.

Bates Valve Bag Co.
7310 South Chicago Avenue, Chicago, Ill.

QUARRY OPPORTUNITY

Quarry producing crushed limestone desires competent man to invest $10,000 in the business and take entire charge of production of new plant. He will be entitled to interest in business and receive salary as superintendent. Must be experienced in handling crushing machinery, well drills, steam shovels, explosives, men, and able to supervise shipments. Quarry located in Pennsylvania, large output, plenty of labor, excellent market, P. R. R. siding. References required. Address

Box 1445 **Care of Rock Products**

Miscellaneous

FOR SALE

Dolomite, limestone, dolomite beach gravel. Drummonds Island, Chippewa County, Michigan. For fluxing iron ores, refining wood pulp, concrete rock, road material, etc.

W. F. COOPER
Box 584 **Sault Ste. Marie, Mich.**

Buyers' Guide of the Rock Products Industry

Classified Directory of Advertisers in Rock Products

Air Compressors
Worthington Pump & Mach. Co.
New York, N. Y.

Bags and Bag Machinery
Bates Valve Bag Co.
Chicago, Ill.
Jaite Co., The
Jaite, Ohio
Valve Bag Co. of America
Toledo, Ohio.

Belting
Cincinnati Rubber Mfg. Co.
Cincinnati, Ohio.
Hettrick Mfg. Co.
Toledo, Ohio
Main Belting Co.
Philadelphia, Pa.
New York Belting & Packing Co.
New York, N. Y.
U. S. Rubber Co.
New York, N. Y.

Belt Fasteners
Crescent Belt Fastener Co.
New York, N. Y.

Belt Lacing
Crescent Belt Fastener Co.
New York, N. Y.

Belt Rivets
Crescent Belt Fastener Co.
New York, N. Y.

Bins, Storage
Preston Co., J. M.
Lansing, Mich.

Brick Machines
General Service Corp.
Chicago, Ill.
Wert Mfg. Co.
Chicago, Ill.

Blasting Supplies
Aetna Explosives Co.
New York, N. Y.
Atlas Powder Co.
Philadelphia, Pa.
Du Pont de Nemours & Co., E. I.
Wilmington, Del.
Grasselli Powder Co.
Cleveland, Ohio.

Buckets, Elevator
Hendrick Mfg. Co.
Carbondale, Pa.
Orton & Steinbrenner
Chicago, Ill.

Buckets
Advance Eng. Co.
Cleveland, O.
Brown Hoisting Mach. Co.
Cleveland, Ohio.
Browning Co.
Cleveland, Ohio.
Buffalo Hoist & Derrick Co.
Buffalo, N. Y.
Marion Steam Shovel Co.
Marion, Ohio.
McMyler Interstate Co.
Cleveland, Ohio.
Owen Bucket Co.
Cleveland, Ohio.

Calcining Machinery
Atlas Car & Mfg. Co.
Cleveland, Ohio.
Butterworth & Lowe
Grand Rapids, Mich.

Chains and Transmitting Machinery
Columbus-McKinnon Chain Co.
Columbus, O.
U. S. Chain & Forging Co.
Pittsburgh, Pa.

Chains, Dredge
U. S. Chain & Forging Co.
Pittsburgh, Pa.

Conveyors and Elevators
Caldwell, H. W., & Son Co.
Chicago, Ill.
Gifford-Wood Co.
Hudson, N. Y.
Jeffrey Mfg. Co., The
Columbus, Ohio.
Link Belt Co.
Chicago, Ill.
Portable Machinery Co.
Passaic, N. J.
Robins Conveying Belt Co.
New York, N. Y.
Smith Eng. Works
Milwaukee, Wis.
Stephens-Adamson Mfg. Co.
Aurora, Ill.
Sturtevant Mill Co.
Boston, Mass.
Universal Road Mach. Co.
Kingston, N. Y.
Webster Mfg. Co.
Chicago, Ill.

Cranes—Locomotive Gantry
American Crane & Eng. Co.
Toledo, Ohio.
Advance Eng. Co.
Cleveland, O.
Ball Engine Co.
Erie, Pa.
Brown Hoisting Mach. Co.
Cleveland, Ohio.
Browning Co.
Cleveland, Ohio.
Byers Mach. Co., John F.
Ravenna, Ohio.
Chisholm-Moore Mfg. Co.
Cleveland, Ohio.
McMyler-Interstate Co.
Cleveland, Ohio.
Ohio Locomotive Crane Co.
Bucyrus, Ohio.
Orton & Steinbrenner
Chicago, Ill.
Osgood Co., The
Marion, Ohio.

Crushers and Pulverizers
Allis-Chalmers Mfg. Co.
Milwaukee, Wis.
American Pulverizer Co.
St. Louis, Mo.
Austin Mfg. Co.
Chicago, Ill.
Bacon, Earle C., Inc.
New York, N. Y.
Buchanan Co., Inc., C. G.
New York, N. Y.
Bradley Pulverizer Co.
Allentown, Pa.
Butterworth & Lowe
Grand Rapids, Mich.
Chalmers & Williams
Chicago Heights, Ill.
Gruendler Pat. Crusher & Pulv. Co.
St. Louis, Mo.
Jeffrey Mfg. Co., The
Columbus, Ohio.
K. B. Pulverizer Co.
New York, N. Y.
Kennedy-Van Saun Mfg. & Eng. Corp.
New York, N. Y.
Kent Mill Co.
Brooklyn, N. Y.
Lewistown Fdry. & Mach. Co.
Lewistown, Pa.
McLanahan-Stone Mach. Co.
Hollidaysburg, Pa.
Munson Mill Machinery Co.
Utica, N. Y.
Pennsylvania Crusher Co.
Philadelphia, Pa.
Raymond Bros. Impact Pulverizer Co.
Chicago, Ill.
Smidth & Co., F. L.
New York, N. Y.
Smith Eng. Works
Milwaukee, Wis.
Sturtevant Mill Co.
Boston, Mass.
Traylor Eng. & Mfg. Co.
Allentown, Pa.
Universal Crusher Co.
Cedar Rapids, Iowa.
Universal Road Mach. Co.
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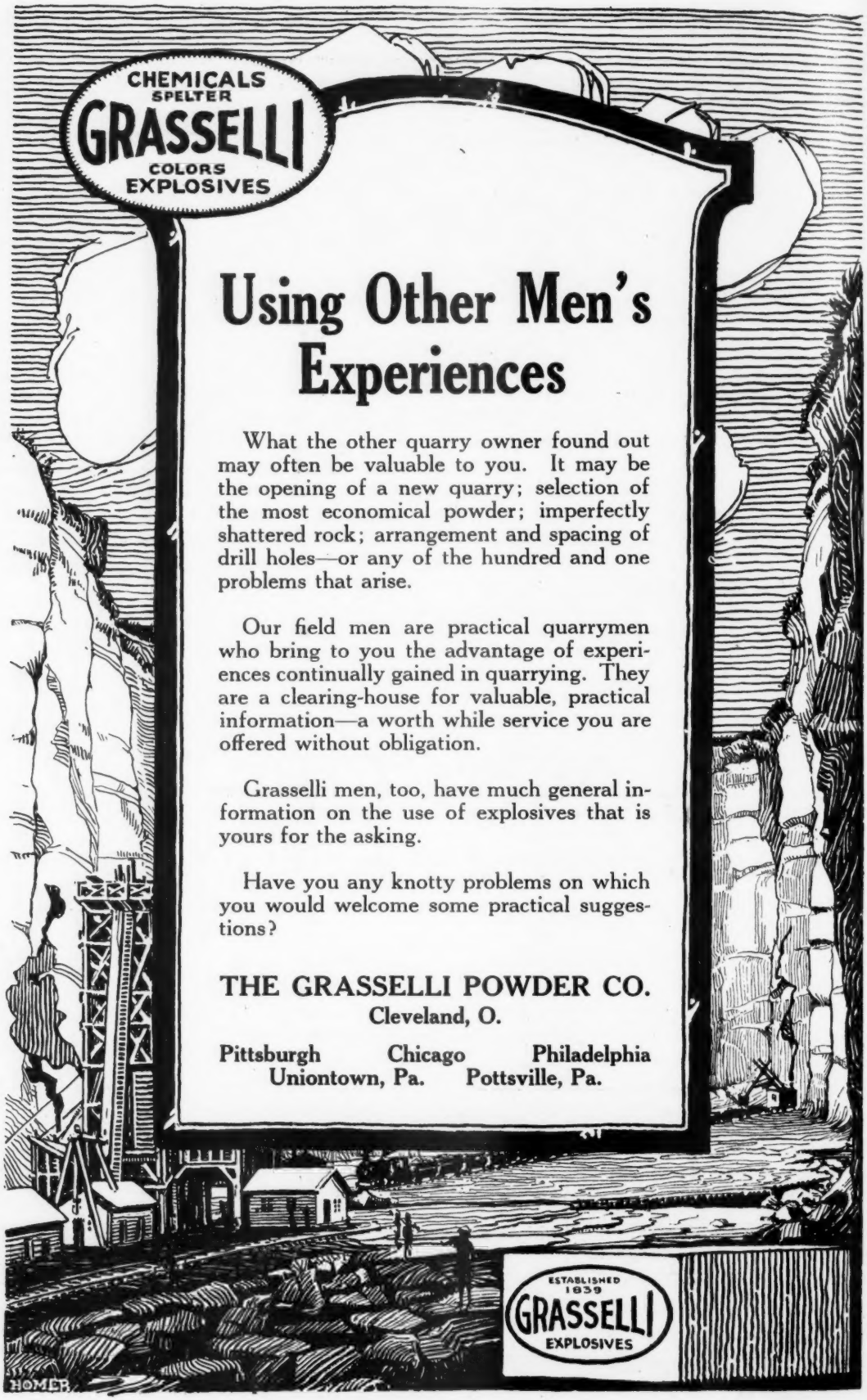
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